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Notes from the East African Herbarium: VI*

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Notes on African Convolvulaceae (Part 2)

MERREMIA [DENNST. ex] HALLIER f.

Dennstedt's publication of this name was not accompanied by a description and it therefore dates from Hallier f. in Engl., Bot. Jahrb. **16,** 581 (1893).

M. peltata (*L.*) *Merr.*, Interpr. Rumph. Herb. Amb. 441 (1917).

Convolvulus peltatus L., Sp. Pl. 1194 (1753).

This robust climber has not been recorded from East Africa before. It may be an introduction from the Mascarenes but it might just possibly be native, though such a conspicuous plant could hardly be overlooked.

ZANZIBAR. Pemba Island: Kengeja, s.l., Oct. 1949, *R. O. Williams* H 2154/49 (K): strong woody rampant climber smothering all vegetation over an area of several acres including the tallest clove trees which appear from the distance as monuments; flowers pure white to yellowish.

M. stellata *Rendle* in Journ. Bot. (London) **46,** 179 (1908).

Astromerremia digitata Pilger in Notizbl. Bot. Gart. Berlin **13,** 107 (1936).

If stellate hairs are the chief reason for separating *Astripomoea* (=*Astrochlaena*) from *Ipomoea*, then it would appear reasonable to maintain *Astromerremia* as a distinct genus from *Merremia*; stellate hairs are not, however, the only character and there are other groups of both *Merremia* and *Ipomoea* which contain species with stellate hairs. I am inclined to leave the species in *Merremia* and since it does not concern the flora of East Africa I merely point out the above synonymy. The holotype of Rendle's species and an isotype of Pilger's are preserved at the BM.

* Continued from K.B., **1957,** 355 (1957).

M. umbellata (*L.*) *Hallier* f. in Engl., Bot. Jahrb. **16,** 552 (1893).

Convolvulus umbellatus L., Sp. Pl. 155 (1753).

C. aristolochiofolius Mill., Gard. Dict., ed. 8, no. 9 (1768).

C. multiflorus Mill., Gard. Dict., ed. 8, no. 15 (1768).

C. cymosus Desr. in Lam., Encycl. **3,** 556 (1791).

C. bifidus Vahl, Symb. Bot. **3,** 30 (1794).

C. triflorus Vahl, Symb. Bot. **3,** 30 (1794).

Although four of the above names are not concerned with the African flora and the above synonymy is probably well-known, it seems worth-while mentioning that I have examined the holotypes of all six and can confirm that they are all forms of this variable and widespread species. *C. bifidus* has a many-flowered inflorescence and woolly leaves. *C. triflorus* has 3-flowered inflorescences and narrow pubescent leaves.

M. tridentata (*L.*) *Hallier* f. in Engl., Bot. Jahrb. **16,** 552 (1893), subsp. **alatipes** (*Dammer*) *Verdcourt* comb. nov.

M. alatipes Dammer in Pflanzenwelt Ost-Afr. **C,** 330 (1895).

M. angustifolia (Jacq.) Hallier f. var. *alatipes* (Dammer) Rendle in F.T.A. **4** (2), 112 (1905).

This is the most distinct of all the many forms of *M. tridentata* and the only one which is at all clear cut. It occurs in the coastal areas of Kenya and Tanganyika; also in Zanzibar, Portuguese East Africa and Northern Rhodesia.

M. medium (*L.*) *Hallier* f. in Engl., Bot. Jahrb. **16,** 552 (1893).

Convolvulus medium L., Sp. Pl. 156 (1753).

Aniseia medium (L.) Choisy in Mém. Soc. Phys. Hist. Nat. Genève **6,** 482 (1834).

Jacquemontia hastigera Bojer, Hort. Maurit. 229 (1837), *nomen nudum.*

This species is close to *Aniseia* spp. since it has very unequal calyx-lobes, being practically the only *Merremia* which has, but the foliage and habit are very similar indeed to those of *M. tridentata.* It has not been officially recorded from Africa before.

Tanganyika. Kiserawe District: Pugu Forest Reserve, June 1954, *Semsei* 1734 (EA, K): climber with yellow flowers; Pugu Hills, May 1936, *Vaughan* 2372 (EA): common herb with golden-yellow flowers. Morogoro, 950 m., 13 Feb. 1932, *Schlieben* 3433 (BM, P). Njombe District: Ruhudji, Lupembe, 700 m., 12 Oct. 1931, *Schlieben* 1343 (BM, K, P). Kilwa District: Kitapi, Pungutini, 4 April 1912, *Braun* 3680 (EA). Lindi District: Mwera Plateau, Kondokwa, 50 km. W. of Lindi, 600 m., 20 Oct. 1934, *Schlieben* 5487 (BM, P).

Portuguese East Africa. Niassa: Macomia, 9 Sept. 1948, *Pedro* & *Pedrogão* 5124 (EA): plant with yellow flowers.

Comoro Islands. Johanna Island, 1839, *Bojer* (G, basis of *Jacquemontia hastigera* Boj.).

M. ampelophylla *Hallier* f. in Engl., Bot. Jahrb. **18,** 115 (1893).

M. guerichiana [Engl. ex] Hallier f. in Engl., Bot. Jahrb. **18,** 115 (1893) *quoad spec. Fischer* 34, *nomen nudum.*

This distinctive plant with a deeply, acutely, lobed corolla has been much overlooked, although it is a characteristic plant of roadsides in Ukamba

country. *Verdcourt* 1198 and *Fischer* 34 have more sharply acute divisions of the leaf-lobes than the plant which has been considered typical. Without further material from S.W. Africa it is impossible to say if *Guerich* 12 is the same as *Fischer* 34 to which plant Hallier f. also gave the name *M. guerichiana*.* It is related to *M. dissecta* (Pers.) Hallier f., *M. vitifolia* (Burm. f.) Hallier f. and *M. multisecta* Hallier f., all of which have the corolla-limb more or less lobed in the same way.

KENYA. Tana River below the Itanga Hills, sandy river silt, Aug. 1953, *C. van Someren* in EA 10560 (EA). Machakos District: Ulu, *Fischer* 412 (B, holotype†). Teita District: 3 km. W. of Voi, on bare road surface, 30 Dec. 1954, *Verdcourt* 1198 (EA, K): branched prostrate herb with stems up to 1 m. long radiating from the root-stock, corolla-limb deeply lobed, lemon-yellow, throat brown-claret within; (also seen at Makindu). Kitui District: Kiambere, 25 Nov. 1951, *Kirrika* 152 (EA, holoneotype, K, isoneotype): creeping on the ground, common, flowers yellow.**

TANGANYIKA. 'Massailand', *Fischer* 34 (HBG). Umba Steppe, Kivingo District, 450 m., 2 Jan. 1930, *Greenway* 2012 (EA, K): perennial prostrate herb with primrose-yellow flowers growing in a deep red soil in *Acacia* desert country.

M. ampelophylla *Hallier f.* subsp. **obtusa** *Verdcourt*, subsp. nov.; a *M. ampelophylla* typica sepalis exterioribus ± rotundatis, corollae lobis longioribus usque 18 mm. longis facile distinguenda.

ETHIOPIA. Mega–Yavello Road, 4° 38′ N, 38° 15′ E, *Acacia-Commiphora* scrub on red sandy loam, 27 Nov. 1952, *J. B. Gillett* 14466 (EA, holotype of subsp., K, isotype): branches prostrate, flowers pale brownish-yellow with purple centre.

This species has by far the most lobed corolla reported for the genus. Most generic descriptions state that the corolla-limb is practically entire.

Three new species of *Merremia* have recently been collected in the Northern Frontier Province of Kenya. One is represented by poor material insufficient for description but Mr. C. F. Hemming has collected excellent material of the other two.

M. hemmingiana *Verdcourt*, sp. nov.; affinis *M. cliffordii* Hutch. et Bruce sed sepalis multo minoribus differt.

Herba perennis, caulibus prostratis usque ad 1·2 m. longis e radice lignosa ortis pilis patulis ± glandulosis obtectis; internodia 2–8 cm. longa. *Folia* ambitu subrotundata, 1·3–3·5 cm. longa et 1·2–4 cm. lata, utrinque pilis setaceis patentibus ornata, 7–9-palmati-lobata, lobis ambitu obovato-oblongis usque 3 cm. longis bi- vel tri-pinnatifidis lobulatis crispato-undulatis oblongis vel deltoideis divisis; nervi laterales subtus prominentes; petiolus 0·6–1·5 cm. longus, setoso-pilosus. *Flores* axillares, solitarii, pedunculis pilosis 1·5–2·5 cm. longis, pedicellis 0·5–2 cm. longis; bracteae parvae, lineares, 5 mm. longae et 0·5 mm. latae. *Sepala* ovato-oblonga, pilosa, apice acutiuscula vel rotundata, 6 mm. longa et 2–3 mm. lata. *Corolla* 1·5–2 cm. longa, leviter lobata, lobis 3–4 mm. longis et 8 mm. latis obtusis, flava, medio purpureo, partibus mesopetalis pubescentibus. *Stamina* 5, filamentis 5–8 mm. longis; antherae 3 mm. longae, apice tortae. *Ovarium* subglabrum, ovoideum, 1·5 mm. longum. *Stylus* 14 mm. longus, stigmate bigloboso, 0·8 mm. lato. *Discus* 1·3 mm. latus et 0·4 mm. altus. *Capsula* ignota.

* Dr. Meeuse states (*in litt.*) that no *Merremia* resembling *ampelophylla* closely has been found in South West Africa. *M. guerichiana* therefore does not occur in E. Africa.

**Since this was written, specimens have also been seen from Kenya, Isiolo (*Adamson* 696), Tsavo Park, near Mzima Springs (*Verdcourt* 2078) and Kitui District, 174 km. from Nairobi towards Garissa (*Verdcourt* 2087).

KENYA. Northern Frontier Province: Wajir, Jan. 1955, *C. F. Hemming* 452 (EA, holotype, K, PRE, isotypes): procumbent plant with trailing stems up to 1·2 m., flowers yellow with purple centre; same locality, on rocky and sandy ground, 24 Dec. 1943, *Bally* 3728 (EA, K): trailing herb with very crinkly leaves (this sheet had been misidentified as a *Cucumis* and indeed the leaves have the texture and appearance of that genus.)

M. subpalmata *Verdcourt*, sp. nov.; affinis *M. semisagittae* ([Griseb. ex] Peter) Dandy, sepalis truncatis vel emarginatis, floribus minoribus, caulibus pilis longis patentibus obtectis differt.

Herba perennis, caulibus prostratis usque ad 0·3–1 m. longis, pilis longis tenuibus patentibus basi leviter tuberculatis obtectis; internodia 2–5 cm. longa. *Folia* ad basin palmatilobata, lobis 3 pilosis vel glabrescentibus; lobi laterales trifidi, lobulis linearibus usque 4·5 cm. longis et 1·7–3 mm. latis, saepe iterum divisi; lobo medio integro vel pinnati-dissecto; petiolus 1·6–3 cm. longus, pilosus. *Flores* axillares, solitarii, vel in cymas 2–3-floras laxissime dispositi, pedunculis 1·7–3 cm. longis pilosis, pedicellis 0·4–1·5 cm. longis; bracteae minutae. *Sepala* subaequilonga, elliptica vel oblonga, apice obtusa vel truncata (vel acutiuscula, mucronulata), 6(–9) mm. longa et 3·5(–5) mm. lata, glabra. *Corolla* glabra, flava, medio purpureo, levissime lobata, 1·6 cm. longa. *Stamina* 5, filamentis 8–11 mm. longis; antherae 3 mm. longae. *Ovarium* ovoideum, glabrum, 1 mm. longum. *Stylus* 14 mm. longus, stigmate bigloboso 1 mm. lato. *Capsula* ignota.

KENYA. Northern Frontier Province: Wajir, 51 m., Jan. 1955, *C. F. Hemming* 451 (EA, holotype, K, PRE, isotypes): procumbent plant with trailing stems up to 0·9 m., flowers yellow with purple centre; same locality, 120 m., 16 Nov. 1940, *West* 5065 (PRE): flowers yellow; El Bururi, 3° 56′ N, 39° 57′ E, 810 m., 20 May 1952, red sandy loam on granite rocks, *Gillett* 13241 (EA, K): corolla yellow with violet centre.

The Gillett specimen does not quite agree in all characters with the type, having more acute sepals, but I believe it is conspecific. Another specimen has been collected very recently which connects this species with *M. semisagitta*. The sepals are acute but small, 4·5 mm. long and the long hairs are present. More material may show that the new species should be extended to include this plant.

ETHIOPIA. Ogaden: Scillave, 6° 05′ N, 44° 45′ E, open bush country on red sandy soil, 390 m., 11 April 1956, *Simmons* S 144 (EA): common creeper with yellow flowers, 'Harig Midu' (Somali).

Since the plate of *I. stenophyton* Chiov. closely resembles a *Merremia*, the type was borrowed from Florence (Italian Somaliland, Migiurtini, coast and dunes at Hafun, 30 Jan. 1924, *Puccioni & Stefanini* 32). It has no flowers but the seeds are woolly, which is incorrect for the genus *Merremia* as far as is known. The specimen is otherwise exceedingly like *M. semisagitta* ([Griseb. ex] A. Peter) Dandy of which fruits have not been seen. Further material will show, in all probability, that they are the same. The matter is of some importance since the name *semisagitta* was not properly published and *stenophyton* would become available.

STICTOCARDIA Hallier f.

S. lutambensis (*Schulze-Menz*) *Verdcourt* comb. nov.

Ipomoea lutambensis Schulze-Menz in Notizbl. Bot. Gart. Berl. **14,** 111 (1938).

Although fruits of this species have not yet been seen, from its general facies it is certainly more correctly placed in *Stictocardia*. The truncate sepals and glandular dots on the leaves beneath are characteristic of that genus.

TANGANYIKA. Uluguru Mts., 210–360 m., 11 April 1935, *E. M. Bruce* 1036 (EA, BM, BR, K): forest liane with pale mauve flowers 7·5 cm. long. Lindi District: Lutamba Lake, 200 m., 26 March 1935, *Schlieben* 6181 (B, holotype†, isotypes at BM, BR, G, & P): twiner with lilac flowers.

This species has absolutely no relationship with *Ipomoea digitata* with which its author compared it.

S. beraviensis (*Vatke*) *Hallier f.* in Engl., Bot. Jahrb. **18,** 159 (1893).

?*Ipomoea velutina* R. Br., Prodr. 485 (1810).

The type of Brown's Australian species is at the British Museum and I believe it is the same as the Madagascar species but I have seen only one sheet (types) from each country so the synonymy is tentative. *I. hierniana* Rendle is probably also synonymous.

S. beraviensis (*Vatke*) *Hallier f.* subsp. **laxiflora** (*Baker*) *Verdcourt*, comb. nov.

Argyreia? *laxiflora* Baker in Kew Bull. **1894,** 67 (1894).

Ipomoea buchanani Baker in Kew Bull. **1894,** 73 (1894).

Rivea pringsheimiana Dammer in Pflanzenwelt Ost-Afr. **C,** 334 (1895).

Stictocardia pringsheimiana (Dammer) Hallier f. in Bull. Herb. Boiss. **6,** 548 (1898).

S. laxiflora (Bak.) Hallier f. in Bull. Herb. Boiss. **6,** 548 (1898).

Ipomoea pringsheimiana (Dammer) Rendle in F.T.A. **4** (2), 185 (1905).

I have examined holotypes or isotypes of the above taxa and consider them to be synonymous. The character of peduncle length is I feel too variable to keep *laxiflora* up as a separate species.

S. woodii (N. E. Br.) Hallier f. may also have to be sunk into this subspecies.

Whilst dealing with this genus the following may be mentioned:—

Argyreia grantii Baker in Kew Bull. **1894,** 67 (1894).

I have examined the type of this species and consider it to be a form of the widespread and variable *Ipomoea hildebrandtii* Vatke.

ASTRIPOMOEA Meeuse**

(*Astrochlaena* Hallier f. non *Asterochlaena* Corda nec *Asterochlaena* Garcke).

The name *Astrochlaena* Hallier f. is very unfortunately preoccupied by a palaeobotanical name. Although slightly differently spelt, the difference is not sufficient and, indeed, *Astro* and *Astero* are specifically mentioned in the International Code of Botanical Nomenclature as examples of inadmissible spelling variants.

Greater difficulty has always been experienced in naming members of this genus, than found in any other part of the family in East Africa and, as is so often the case, this has proved to be due to the fact that far too many species have been described and also to the fact that the species are intrinsically

**In Bothalia 6 : 709 (1958—the 1957 on cover is an error)

variable. The account in the Flora of Tropical Africa is, unlike that of most of the rest of the family, very poor.

Stellate hairs are the key character separating this genus from *Ipomoea* but there remain in the latter genus several extra-African species also with a stellate indumentum but obviously not conspecific with the species of *Astripomoea*. *Astripomoea* has a somewhat 'solanaceous' facies instantly recognisable in the field. This is I feel sufficient cause to maintain the generic separation. Baker and Rendle (F.T.A. **4** (2), 127 (1905)) suggest that *Ipomoea dendroidea* Choisy, which they had not seen, was probably an *Astrochlaena*. Hallier f. (Meded. Rijksherb. Leiden, **1**, 21 (1911) refers it to *Merremia tomentosa* (Choisy) Hallier f., a South American species, and suggests that the type locality of Angola indicated for *I. dendroidea* is incorrect. I have examined the type at Paris and it is certainly not in any way similar to any *Astripomoea*. The leaves are thick, narrowly elliptic, rounded at the base and acute at the apex (one 4·2 cm. long and 1·1 cm. wide had 6 lateral nerves), very densely yellow-stellate-tomentose, as for example in *Solanum bojeri* and its allies. The calyx-lobes are very unequal and narrow. The corolla is narrowly infundibuliform. I have examined some Brazilian specimens of *Merremia tomentosa* kindly loaned from Kew and agree entirely with Hallier f. Although the locality 'Angola' is incorrect, it is interesting to remember that a stellately hairy *Merremia* is indigenous to that territory.

KEY TO AND SYNOPSIS OF THE EASTERN AFRICAN SPECIES OF ASTRIPOMOEA

1. Young stems minutely but densely muriculate; leaves truncate or obtuse; leaves and flowers usually fascicled on dwarf shoots scattered along the stem . . . . . 1. *A. nogalensis* (Chiov.) Verdc.

1. Stems not muriculate; leaves not fascicled on dwarf shoots 2

2. Corolla 9 cm. long or more, tube narrow 3

2. Corolla up to 5 cm. long, tube wider 4

3. Plant erect; inflorescences many-flowered; outer sepals shorter; limb of buds tomentose . . . . . 2. *A. tubiflora* (Hallier f.) Verdc.

3. Plant trailing; flowers solitary (always?); sepals subequal; corolla glabrous . . . . . 3. *A.* sp. nov.

4. Sepals very short, 3 mm. long 7. *A.* sp. (too poor for description)

4. Sepals exceeding 4 mm. 5

5. Perennial herbs with several erect or prostrate stems from a woody base; leaves elliptic to cordate-orbicular (if orbicular and about 10 cm. in diameter see also *A. delamereana*); corolla entirely mauve
4. *A. malvacea* (Klotzsch) Meeuse

5. Annual herbs or short-lived perennials; stems ± single but often much branched above the rootstock; corolla entirely mauve or white with mauve centre 6

6. Corolla small, about 1–1·5 cm. long, (annual)
5. *A. lachnosperma* (Choisy) Meeuse

6. Corolla longer, over 2 cm. long 7

7. Leaves suborbicular or broadly ovate, up to 10 cm. in diameter
6. *A. delamereana* (Rendle) Verdc.

7. Leaves elliptic-lanceolate to ovate or spathulate 8

8. Leaves cuneate to rounded at the base 9

8. Leaves subcordate at the base . 11. *A. cephalantha* (Hallier f.) Verdc.

9. Leaves elliptic to obovate, coarsely crenate-lobed; peduncles and petioles always free . . . . . 8. *A. grantii* (Rendle) Verdc.

9. Leaves usually elliptic-lanceolate, slightly repand or entire; leaves sometimes borne on the peduncles 10

10. Plant densely stellate-tomentose, with hairs with short rays and stalks; bracts smaller and flowers in loose inflorescences
9. *A. hyoscyamoides* (Vatke) Verdc. var. *hyoscyamoides*

10. Plant stellate-hairy with hairs with long rays and stalks; bracts larger and more ovate; flowers in dense capitate, bracteate inflorescences . 11

11. Flowers white or white with purple eye
9b. *A. hyoscyamoides* var. *melandrioides* (Hallier f.) Verdc.

11. Flowers entirely mauve . . 10. *A. polycephala* (Hallier f.) Verdc.

The species *lachnosperma*, *grantii* and *hyoscyamoides* are linked by intermediates and are indistinctly defined.

1. **A. nogalensis** (*Chiov.*) *Verdcourt*, comb. nov.

Astrochlaena nogalensis Chiov., Fl. Som. **1,** 236 (1929).

Somaliland Protectorate. Wadamago to Ainabo, dry sandy scrub and bush, 1200 m., 5 Aug. 1941, *Peck* 21 (EA): erect or straggling, 0·9 m. tall, grazed by all stock, 'Chadere' (Somali). Balleh Sirauw area, 21 Nov. 1944, *Glover & Gilliland* 353 (EA, K): small erect branching shrub, frequently flowering before the leaves, flowers white, infrequent, 'Chader' (Somali). Haud, border country near Bohodle, 28 Oct. 1944, *Glover & Gilliland* 218 (EA, K): straggling bush with pink flowers, in thickets, eaten by camels and goats.

Ethiopia. Ogaden, El Rago, Nov. 1953, *Simmons* 25 (EA). 7° 50′ N, 45° 50′ E, in thin bush, 800 m., 4 Oct. 1953, *Ellis* 103 (K): rare small shrub 1·2 m. tall with thin twisty stems, corolla white with mauve centre. W. of Wardere, 7° 00′ N, 45° 05′ E, in medium bush on red sandy soil, 750 m., 28 Nov. 1954, *Ellis* 329 (K): occasional shrub up to 1·5 m., corolla white with mauve centre. Haud, sandy soil with open grassland and bush, 600 m., 8 Feb. 1954, *Bally* 9630 (EA, K): bush 1·2–1·5 m. tall with straggling stems bearing few leaves, flowers white with dark purple throat, locally common. Danot–Mersin road, 7° 30′ N, 45° 10′ E, thornbush on red sandy soil, 690 m., 3 April 1956, *Simmons* S 19 (EA): bush to 1·5 m., flowers mauve and white.

Somalia. Bacino del Nogal, between Balli Iglole and Bei Dagoi, 22 June 1924, *Stefanini & Paoli* 874 (FI).

2. **A. tubiflora** (*Hallier f.*) *Verdcourt*, comb. nov.

Astrochlaena tubiflora Hallier f. in Ann. Ist. Bot. Roma **7,** 228 (1898).

Ethiopia. Galla Country, Irma near the R. Daua, *Riva* 1469 (FI, holotype).

This species is an analogue of section *Eriospermum* in *Ipomoea*. The large bracts and rather woolly seeds are similar. The plant that follows is also very similar. This is yet another example of the close reticulation of characters in this family.

3. **A.** sp.

This plant is closely allied to *A. tubiflora* but is a creeper with solitary flowers (at least in the specimen seen). The sepals are subequal, whereas in the latter they are very unequal, the outer being much the shorter. The buds of *A. tubiflora* have the limb tomentose and, although there are no buds on the Kenya sheet, the open corollas are quite glabrous. In a genus which contains polymorphic species it is just possible that this is only an aberrant form, but more material is necessary.

KENYA. Northern Frontier Province: Uaso Nyiro, open desert plains, 900 m., *Hayett* 21 (K): usually lies flat on the ground but can climb other plants, flowers white, 'Kalacha' (Boran).

4. **A. malvacea** (*Klotzsch*) *Meeuse* in Bothalia **6,** 710 (1958).

Astrochlaena malvacea (Klotzsch) Hallier f. in Engl., Bot. Jahrb. **18,** 121 (1893).

This is an extremely polymorphic species containing some extreme variants. The classification proposed below is the best that can be done but leaves much to be desired. The species presents the same problems as *Bersama abyssinica*, *Pentas lanceolata* and *Clematopsis scabiosifolia*. In such species, I believe the only way of defining a given individual would be by means of some formula expressing the outward manifestations of 'gene content'.

KEY TO THE INFRASPECIFIC VARIANTS OF A. MALVACEA

1. Leaves densely grey-white tomentose above and beneath
4e. var. *involuta*

1. Leaves discolorous, much more densely tomentose beneath than above 2

2. Peduncles absent or nearly so; a small semi-prostrate form with dense close white tomentum on the undersides of the leaves
4c. var. *epedunculata*

2. Peduncles present 3

3. Stems prostrate or straggling; leaves usually ovate-orbicular, cordate at the base and obtuse or rounded at the apex, usually not exceeding about 4 cm. in length and breadth . . . . . 4b. var. *volkensii*

3. Stems often erect; leaves ovate, rhomboid, or ovate-lanceolate, often more pointed at the apex but in some erect plants orbicular and rounded at the apex, usually more than 4 cm. long 4

4. Tomentum on the undersurface of the leaves floccose, greyish and less fine . . . . . 4d. var. *floccosa*

4. Tomentum on undersurface of the leaves very fine and velvety, ± white
4a. var. *malvacea*

4a. **A. malvacea** (*Klotzsch*) *Meeuse* var. **malvacea.**

Breweria malvacea Klotzsch in Peters, Reise Mossamb., Bot. 245, t. 37 (1861).

?*Astrochlaena engleriana* Dammer in Pflanzenwelt Ost-Afr. **C.** 330 (1895).

Stems erect, up to 1·5 m. tall, sometimes straggling. Leaves ovate, rhomboid, orbicular or elliptic-lanceolate, acute or rounded at the apex, cuneate or subcordate at the base, green and sparsely to fairly densely tomentose above, white and very finely and densely tomentose beneath. Venation usually prominent beneath.

I have not seen the type of *A. engleriana* and it is possible that it belongs nearer to var. *volkensii* or var. *floccosa*. It is however of little importance to tie it down exactly. The type of *B. malvacea* has also been destroyed but the figure is a good one. It is possible that this too is closer to what I have considered intermediates between var. *malvacea* and var. *floccosa*.

The typical variety occurs in South Africa, Rhodesia, Nyasaland, Portuguese East Africa and East Africa. Some representative examples are cited below.

KENYA. West Suk District: Sela, below the escarpment, 1200 m., May 1932, *Napier* 2074 (EA, K): erect woody herb, flowers purple.

TANGANYIKA. Rufiji District: Utete, sandy stony soils, 15 Dec. 1930, *Musk* 76 (EA, K): perennial herb with purple flowers, 'Ruhewe' (vernac.). Without locality, *Busse* 503 (EA).

PORTUGUESE EAST AFRICA. Mocuba District: Lugela, Namagoa Estate, Sept. 194?, *Faulkner* Pre. 150 (EA, K, PRE): small bush.

The following sheets are intermediate between var. *malvacea* and var. *floccosa*.

TANGANYIKA. Morogoro District: Morogoro–Dakowa Road, 14 km. N. of Morogoro, scattered thornbush, 180 m., 25 March 1953, *Drummond & Hemsley* 1787 (EA, K): erect perennial herb, corolla mauve-purple.

PORTUGUESE EAST AFRICA. Niassa: Mandimba, 14 May 1948, *Pedro & Pedrogão* 3394 (EA): perennial prostrate herb; flowers lilac-purple; (in leaf shape this is a good match with Klotzsch's figure). Amaramba, on brown loamy colluvial soils, savannah with *Combretum* etc., 20 Oct. 1948, *Pedro & Pedrogão* 5609 (EA): perennial suffrutescent herb to 0·8 m., flowers lilac-rose; Nametil, 12 July 1948, *Pedro & Pedrogão* 4456 (EA): perennial herb; flowers rosy.

NYASALAND. Port Herald Hills, 60 m., 10 Nov. 1933, *Lawrence* 125 (EA, K). Mt. Mlanje, 900 m., July–Oct. 1939, *Forbes* 114 (EA).

NORTHERN RHODESIA. Lusaka District: 6 km. N. of Lusaka, in open *Brachystegia* woodland with *Combretum* etc., 9 Aug. 1952, *Angus* 180 (EA, FHO): suffrutex with herbaceous stems; flowers mauve with dark purplish centre.

The following sheets are intermediate between var. *malvacea* and var. *volkensii*.

UGANDA. E. Acholi: Madi, Opei, savannah, 900 m., April 1943, *Purseglove* 1367 (EA, K): erect or semi-procumbent herb with purple flowers, 'Mwoney' (Acholi).

BELGIAN CONGO. Ruzizi Valley, Jan. 1947, *Hendrickx* 4418 (EA).

The following form from Tabora is distinctive; it has large round leaves and a very prominent venation below.

TANGANYIKA. Tabora, deciduous woodland, 1200 m., 6 April 1954, *Smith* 886 (EA): tall erect herb to 1·2 m., flowers mauve; and 16 km. W. of Tabora, 1104 m., 4 April 1945, *Wallace* 1223 (EA, K): fairly upright herb to 1·2 m., shoots whippy, corolla mauve with darker centre.

Also distinctive is *Burtt* 2102, a prostrate form with very small leaves.

TANGANYIKA. Mbulu District: Gebogo Hill, Mgati Plains, on volcanic rubble, 1740 m., 25 April 1929, *Burtt* 2102 (EA, K): growing in tufts, flowers pink to crimson.

Astrochlaena malvacea var. *parviflora* Rendle in F.T.A. **4** (2), 122 (1905), described from 'Nth of Lake Nyassa' (*Thomson*, K, holotype) is an intermediate between var. *malvacea* and var. *volkensii*.

4b. **A. malvacea** (*Klotzsch*) *Meeuse* var. **volkensii** (*Dammer*) *Verdcourt*, comb. nov.

Convolvulus phillipsiae Baker in Kew Bull. **1895,** 221 (1895).

Astrochlaena volkensii Dammer in Pflanzenwelt Ost-Afr. **C,** 331 (1895).

A. stuhlmannii Hallier f. var. *parviflora* Rendle in F.T.A. **4** (2), 122 (1905).

A. phillipsiae (Baker) Rendle, *loc. cit.* 121.

A. rotundata Pilger in Engl., Bot. Jahrb. **45,** 222 (1910)*

A. magisii De Wild. in Bull. Jard. Bot. Brux. **3,** 260 (1911).

A. mildbraedii Pilger in Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped. 1907–8, **2,** 277 (1911).

A. ledermannii Pilger in Engl., Bot. Jahrb. **48,** 350 (1912).

A. menispermoides Standley in Smithson. Miscell. Coll. **68** (5), 11 (1917).

Perennial herb with prostrate branches. Leaves orbicular-ovate, cordate or rounded at the base, rounded or obtuse at the apex, apiculate, mucronulate or bluntly acute, about 4 cm. or less in length and breadth, tomentose but green above, densely but not very finely subfloccosely tomentose below. Some typical specimens are cited below. The variety occurs in Somaliland Protectorate, Sudan, Ethiopia, Rhodesia, Belgian Congo, Natal and the Cameroons. Some intermediates also occur in Nigeria. It is a plant of grassland and grassland with light bush cover and has the usual distribution of such plants in Tropical Africa. I have not seen the types of two of the three Pilger species quoted above in synonymy which were described from South West Africa, Cameroons, and Bukoba District in Tanganyika.

A specimen of *Ledermann* 3198, an isotype of *A. ledermannii*, is preserved at the BM.

Somaliland Protectorate. Golis Range, *Lort Phillips* (K, holotype of *C. phillipsiae* Baker).

Ethiopia. Agheremeriam, grassland, 1890 m., 30 Nov. 1952, *Gillett* 14503 (EA, K): flowers purple with darker centre.

Kenya. Near Nairobi, 2000 m., 26 May 1909, *Mearns* 236 (US, holotype of *A. menispermoides* Standley, BM, isotype). Thika Road 8 km. N. of Nairobi, in grassland, 1650 m., 30 April 1954, *Verdcourt* 1125 (EA, K): plant with several straggling stems from a woody rootstock, flowers pale purple. Rumuruti District, in grass, 1950 m., July 1931, *Napier* 1230 (EA, K): woody trailing herb with purple flowers. Muhoroni to Kisumu, grassland, 14 Dec. 1905, *G. Baker in Battiscombe* 356 (EA, K): creeper with reddish-purple flowers.

Uganda. Kigezi District: Kamwesi, grassland, 1650 m., July 1949, *Purseglove* 2998 (EA, K): procumbent herb with mauve flowers. Karamoja District: Morutukan, grassland, 1200 m., 26 May 1940, *A. S. Thomas* 3552 (EA, K): common herb spreading to 1·2 m., flowers mauve; and Amaler, at base of Mt. Debasien, 1936, *Eggeling* 2548 (EA, K). Mpororo (ubi?), *Scott Elliot* 8044 (BM, holotype of *A. stuhlmannii* var. *parviflora* Rendle, K, isotype).

Tanganyika. Bukoba District: Bunazi, grass thicket on grey, sandy alluvial soil, 1936, *Gillman* 483 (EA, K). Kilimanjaro, Marangu, Rahe Steppe, *Volkens* 2120 (BR, isotype).

Belgian Congo. Uele, Durumu, 1907–8, *Magis* (BR, holotype of *A. magisii* De Wild.).

4c. **A. malvacea** (*Klotzsch*) *Meeuse* var. **epedunculata** (*Rendle*) *Verdcourt* comb. nov.

Astrochlaena malvacea var. *epedunculata* Rendle in Journ. Bot. (London) **39,** 59 (1901).

Branches suberect or trailing. Leaves small, 1·7–3·5 cm. long and 1·1–2 cm. wide, pubescent above, densely white floccose-tomentose beneath, ovate, cuneate at the base. Flowers solitary or paired, pedicels up to 2 cm. long, peduncle absent or nearly so.

* Meeuse in Bothalia **6,** 711 (1958), keeps this as a distinct species and makes the necessary new combination.

Tanganyika. Mbeya District: Mbosi, 8 and 27 Nov. 1935, *Horsbrugh Porter* (K).

Northern Rhodesia. Mumbwa District: E. of Monas village, burnt grassland in dambos on grey-red clay soils, 1050 m., 18 Sept. 1947, *Greenway & Brenan* 8108 (EA, K): a perennial procumbent herb with trailing stems from a woody rootstock; flowers deep wine-red or mauve-pink or almost white.

Southern Rhodesia. Salisbury, *Rand* 511 (BM, holotype).

4d. **A. malvacea** (*Klotzsch*) *Meeuse* var. **floccosa** (*Vatke*) *Verdcourt*, comb. nov.

Ipomoea floccosa Vatke in Linnaea **43,** 512 (1882).

Astrochlaena floccosa (Vatke) Hallier f. in Engl., Bot. Jahrb. **18,** 121 (1893).

A. stuhlmannii [Dammer ex] Hallier f. in Engl., Bot. Jahrb. **30,** 386 (1901).

A. kaessneri Rendle in F.T.A. **4** (2), 123 (1905).

Stems erect or subprostrate, 0·6–3·6 m. tall, tomentose to densely floccose. Leaves usually large, ovate, elliptic or broadly rhomboid, usually acute at the apex and cordate or rounded at the base, densely pubescent but green above, very densely but coarsely yellow-grey floccose-tomentose beneath.

This variant occurs in Rhodesia, Nyasaland, Portuguese East Africa, East Africa and Nigeria.

Kenya. Fort Hall road, roadside, 1500 m., Jan. 1934, *Napier* 3138 (EA, K): 0·6 m. tall, erect, in scrubby hill country, flowers medium, mauve or white, with or without a darker centre. Meru, 1440 m., June 1932, *M. D. Graham* 1796 (EA, K).

Tanganyika. Mbulu District; Mbulumbul, on chocolate loam, 1920 m., 26 June 1945, *Greenway* 7465 (EA, K): a perennial much-branched, mauve-flowered herb up to 0·6 m. tall. Arusha District: Oldeani, riversides, 1320 m., 19 June 1935, *Davies* 1060 (EA, K): shrub 3–3·6 m. tall. Lushoto District: Makuyuni, 16 Dec. 1935, *Koritschoner* 1192 (EA, K). Morogoro District, 330 m., 17 Dec. 1932, *Wallace* 564 (EA, K).

4e. **A. malvacea** (*Klotzsch*) *Meeuse* var. **involuta** (*Rendle*) *Verdcourt* comb. nov.

Astrochlaena involuta Rendle in Journ. Bot. (London) **39,** 59 (1901).

A form restricted to Kenya.

Kenya. Northern Frontier Province: Marsabit, 1300 m., July 1942, *Mrs. Bally* 1866 (K) and near Lake Marsabit, *Delamere* (BM, holotype).

5. **A. lachnosperma** (*Choisy*) *Meeuse* in Bothalia **6,** 710 (1958).

Ipomoea lachnosperma Choisy in DC., Prodr. **9,** 356 (1845).

Astrochlaena lachnosperma (Choisy) Hallier f. in Engl., Bot. Jahrb. **18,** 121 (1893).

A. solanacea Hallier f. in Engl., Bot. Jahrb. **18,** 121 (1893).

A. grantii Rendle in F.T.A. **4** (2), 123 (1905) quoad spec. *Speke & Grant*, prope Chopeh lect.

This species is closely related to *A. grantii* but the flowers are smaller and less numerous and the leaves usually less lobed. A few specimens are cited below.

Eritrea. Ocule Cusai, Loggo Sarda, Deggahen, 2600 m., 15 Sept. 1902, *Pappi* 1379 (EA, FI, MO).

Kenya. Northern Frontier Province: Wajir, red sandy soils, *Acacia-Commiphora* bush, Jan. 1955, *Hemming* 454 (EA, K): small plant 20 cm. tall, flowers white with purple centres. Masai District: Nairobi–Magadi Road, km. 56, rocky places, 1200 m., 27 June 1952, *Bogdan* 410 (EA, K).

6. **A. delamereana** (*Rendle*) *Verdcourt* comb. nov.

Astrochlaena delamereana Rendle in Journ. Bot. (London) **39,** 60 (1901).

This species is known only from the type collected by Lord Delamere at Cantalla and Hadda in Kenya (presumably in the North) (BM, holotype). It is related to *A. grantii* but the rootstock is quite unknown. When procured it may prove to be nearer to *A. malvacea* var. *floccosa.*

7. **A.** sp. nov.

This plant is known from three duplicates of one rather poor gathering which is inadequate for description. It is characterised by its very small sepals, 3 mm. long and 1·5 mm. wide. It is a shrub up to 3 m. tall; the stems are probably simple, branched and floccose-pubescent above. Leaves ovate, up to 12 cm. long and 6·5 cm. wide, entire, subcordate at the base and bluntly acute at the apex, green and pubescent above and densely grey-tomentose beneath. Corolla mauve, 2·4 cm. long.

Tanganyika. Morogoro District: Mtibwa Forest Reserve, grassland, Sept. 1952, *Semsei* 932 (BR, EA, K): common shrub 2·4–3 m. tall, 'Mkwelonga' (Nguru).

8. **A. grantii** (*Rendle*) *Verdcourt* comb. nov.

[*Convolvulus malvaceus* (Klotzsch) Oliver in Trans. Linn. Soc. **29,** 117 (1875) *sensu* Oliver non *Breweria malvacea* Klotzsch].

Astrochlaena grantii Rendle in F.T.A. **4** (2), 123 (1905).

A. ugandensis Rendle, *op. cit.* 124.

This plant is very close to *A. hyoscyamoides* but the leaves are usually more obovate and deeply crenate-lobed in the apical half. There are intermediates e.g. *Jex Blake* 5173 and *Beaton* 26 which are *hyoscyamoides* with more or less lobed leaves but they have, however, a finer indumentum than that of typical *A. grantii.* On the other hand, there are forms of *A. grantii* with more or less entire leaves! *A. ugandensis* is a depauperate cultivated form of this sort and *Napier* 6106 is ± identical. Actually, in practice, the two species are not difficult to separate. Some typical specimens are cited.

Kenya. Nandi District: Kapsabet, Kaimosi Farm, 15 June 1953, *G. R. Williams* 574 (EA, K): a white, blue or pink-flowered herb up to 1·2 m. Trans Nzoia District: near Kitale, in open grassland, 1875 m., 6 Nov. 1955, *Irwin* 145 (EA, K): upright unbranched herb 0·6–0·9 m., flowers pale purple with darker centres. Uasin Gishu District: Turbo and Kipkarren, 1650 m., Oct. 1931, *Brodhurst Hill* 541 (EA, K): erect herb to 0·75 m., in clumps by roadside or under trees, flowers pale mauve with rosy-purple throat. South Nyanza District: Kuja District, in open bush and grassland 1500 m., July 1934, *Napier* 3420 (EA, K): erect bushy herb 0·6–0·9 m. tall, flowers pale mauve.

Belgian Congo. Kalambo, Aug. 1945, *Hendrickx* 3269 (EA, PRE): suffrutescent, up to 50 cm., flowers pale violet.*

9a. **A. hyoscyamoides** (*Vatke*) *Verdcourt,* comb. nov. var. **hyoscyamoides.**

Convolvulus hyoscyamoides Vatke in Linnaea **43,** 520 (1882).

Astrochlaena hyoscyamoides (Vatke) Hallier f. in Engl., Bot. Jahrb. **18,** 121 (1893).

A. whytei Rendle in F.T.A. **4** (2), 124 (1905).

A. annua Rendle, *op. cit.* 125.

* I have recently seen material from Uganda and Tanganyika.

The form named *whytei* by Rendle is linked by numerous intermediates to typical *A. hyoscyamoides*. In leaf-shape it is intermediate with *A. grantii* (Rendle) Verdcourt. This species is abundant on disturbed ground and in desert-grass country in Kenya and Tanganyika up to 1200 m. It is well-known and usually correctly identified so it is not necessary to cite specimens.

9b. **A. hyoscyamoides** (*Vatke*) *Verdcourt* var. **melandrioides** (*Hallier f.*) *Verdcourt* comb. nov.

Astrochlaena melandrioides Hallier f. in Engl., Bot. Jahrb. **18,** 122 (1893).

This variety differs from the typical one in having larger bracts, which envelop a dense subcapitate inflorescence, and the indumentum is longer and much coarser. There are, however, intermediates. The type has been destroyed but the following specimens agree with the description given by Hallier.

TANGANYIKA. Mwanza District: Mbarika, 12 Sept. 1952, *Tanner* 996 (K). Mbulu District: Katesh, June–July 1954, *Matalu* 3160 (EA): herb to 1·5 m. tall, flowers white.

10. **A. polycephala** (*Hallier f.*) *Verdcourt* comb. nov.

Astrochlaena polycephala Hallier f. in Engl., Bot. Jahrb. **18,** 122 (1893).

The type of this species has also been destroyed but the following sheet, which has large mauve flowers, and a very coarse indumentum, agrees with the description.

TANGANYIKA. Handeni District: Kiberashi, grassland and old cultivations, 1050 m., 25 Aug. 1940, *Hornby* 2016 (EA, K): herb to 1·2 m., flowers mauve, similar in habit to *A. hyoscyamoides*.

11. **A. cephalantha** (*Hallier f.*) *Verdcourt* comb. nov.

Astrochlaena cephalantha Hallier f. in Engl., Bot. Jahrb. **18,** 122 (1893).

The type of this species has also been destroyed and I have seen nothing with a subcordate leaf-base which matches the description. From the description, it appears to be allied to *A. hyoscyamoides*, since the leaves are carried on the peduncles and the flowers are white with a purple centre. The type came from Mwanza so should readily be recollected if it is a genuine species. I suspect it will prove to be a variety of *hyoscyamoides* very similar to var. *melandrioides*.

Glasshouse Heating Systems.*—The first of a new series of leaflets on Horticultural Machinery has recently been issued by the Ministry of Agriculture. It deals with glasshouse heating and the various heating systems available, and demonstrates how improved growing conditions may be obtained by the more efficient use of fuels and labour.

H. S. MARSHALL.

* Glasshouse Heating Systems (Horticultural Machinery Leaflet No. 1. Pp. 8. 1958. London: H.M. Stationery Office, Atlantic House, Holborn Viaduct, E.C.1.

Bengal Trees.*—E. O. Shebbeare, the author of this book, formerly a member of the Indian Forest Service, spent most of his service in Bengal. While there he built up a great reputation for himself as a field naturalist of the first order and every page of this book testifies to the intimate knowledge he had of the trees of the plains forests of Northern Bengal. He initiated the highly original idea of having botanical gardens in the forests themselves. These took the form of strips of forest on which each tree was correctly identified and labelled. Young officers were enabled by this method to get to know their trees in a simple and fascinating way.

The book consists essentially of terse descriptions of some 280 trees arranged in families according to the method of Bentham and Hooker, in which the emphasis is upon easily observable characters such as shape of leaves, presence or absence of glands on the petiole, colour of the sap, nature of the bark and the slash or blaze. The most salient of these 'spot' characters are in bold type. There can be nothing but praise for this part of the book and despite the criticisms of faults which follow and for which the author is not responsible, the demand for the book should be great.

The frontispiece is so badly reproduced that it could with advantage be dispensed with altogether. There is much waste of space in many of the line drawings of leaves. The format is awkward; the book cannot be carried in the pocket and there is no index.

We are told that this book is only a forerunner of the revised edition to come. The present book would be immeasureably improved by the provision of a workable key. More attention should be paid to editing (some striking characters, such as those of *Casearia*, are not in bold type) and there are a number of misprints. *Podocarpus* appears under *Palmae* though this is not meant as is obvious from the accompanying figure.

If these blemishes are removed and the suggested additions made the revised edition will be an exceedingly valuable book.

* Trees of the Duars and Terai, by E. O. Shebbeare. Government Press, Government of West Bengal, no price.

Grapes, Peaches and Nectarines.**—This is another handbook in the Amateur Gardening series dealing with the cultivation of these fruits both in and out of doors. Part 1 deals with grapes and part 2 with peaches and nectarines. The section dealing with grapes out of doors has been contributed by Mr. B. Barrington Brock of the Viticultural Research Station, Oxted, Surrey. Chapters on the cultivation, uses, pests, propagation and varieties of these delicious fruits are included in this handy little book, which is illustrated by 21 line drawings.

H. S. MARSHALL.

** Grapes, Peaches and Nectarines. By H. R. Tuffin. (Amateur Gardening Handbook No. 22). London: W. H. & L. Collingridge Ltd. 1957. Pp. 92, price 4/-.

Notes from the East African Herbarium: VII*

BERNARD VERDCOURT

Notes on African Convolvulaceae (Part 3)†

IPOMOEA L.

Nearly 100 species of this large genus are native to, or commonly naturalised in East Africa. Besides remarks concerning the nomenclature of many of these, information about species from other parts of Africa is included. I have already made‡ some remarks about the difficult question of the division of the genus into sections. Mr. Bullock has since pointed out to me a serious omission in my remarks: I had overlooked a much earlier selection of *Ipomoea pes-tigridis* L. as the type species of *Ipomoea*, made by House in 1908.§

The following notes on the African species in need of nomenclatural revision more or less follow the order laid down in the Flora of Tropical Africa **4** (2) by Baker and Rendle.

I. plebeia *R. Br.*, Prodr. 484 (1810) subsp. **africana** *Meeuse* in Bothalia **6,** 723 (1958).

[*I. cynanchifolia* sensu Hallier f. in Bull. Herb. Boiss. **6,** 538 (1898) et Bak. & Rendle in F.T.A. **4** (2), 137 (1905), *non* C. B. Cl. *nec* Meissn.]

[*I. cardiosepala* sensu Bak. & Wright in Fl. Cap. **4** (2), 61 (1904), *non* [Hochst. ex] Choisy *nec* Meissn.]

KENYA. Northern Frontier Province: Dandu, Zariba, red sandy loam, 750 m., 6 May 1952, *Gillett* 13074 (K): corolla white.

TANGANYIKA. Shinyanga, *Acacia-Commiphora* bush, April 1932, *Bax* 279 (K).

NORTHERN RHODESIA. Mumbwa, July 1912, *Macaulay* 1170 (K). Mapanza Mission, dry grassland, 1050 m., 14 March 1953, *Robinson* 131 (K): climbing herb, stem full of white juice, flowers white, stamens white, style white and stigma pink.

SOUTHERN RHODESIA. Umtali, on shrubs in high grassland, 1140 m., 6 April 1948, *Chase* 656 (K, SRGH): climber with white flowers. 60 miles S. of Fort Victoria, mopane veldt, 16 April 1948, *Rodin* 4244 (K, UC): vine with small white flowers. Ndanga Triangle Sugar Estate, in sugar cane lands, 420 m., 25 Jan. 1949, *Wild* 2731 (K, SRGH): prostrate herb with white flowers. Sabi Valley, Nyanyadzi, in irrigated land, 540 m., 3 Feb. 1948, *Wild* 2497 (K, SRGH): trailing herb with white flowers.

ANGOLA. Luanda, near Imbondeiro dos Lobos, *Welwitsch* 6235 in part (BM). Luanda, *Gossweiler* 226 (BM).

TRANSVAAL. Kaap Muiden, 402 m., 4 May 1929, *Mogg* (EA, PRE). Barberton, lowveldt woodland on chocolate loam flats, 270 m., 21 April 1953, *Codd* 7785 (EA, PRE): twining herb with small white flowers. Zoutpansberg. Wylies Poort, on roadside amongst grass and low plants, 26 Jan. 1954, *Meeuse* 9196 (K, PRE): creeping and twining herb with minute white flowers. Shilouvane, fallow land, July 1899, *Junod* 543 (K): 20–50 cm. high, flowers white.

NATAL. Inanda, March 1881, *Wood* 1258 (K): in Kaffir maize, flowers white. Port Natal [Durban], *Gueinzius* (K). Natal, 1865, *Gerrard* 555 (K).

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* Continued from K.B. **1958,** 197.
† See also paper in Webbia ined.
‡ Taxon **6,** 150–152 (1957).
§ Ann. N.Y. Acad. Sci. **18:** 181 (1908).

This plant, which has been figured by H. Wild in his book 'Common Rhodesian Weeds' fig. 94 (1955), is closely allied to *I. verticillata* Forsk., the type of which I have seen at Copenhagen, *I. morsoni* Baker and *I. eriocarpa* R. Br. I have examined the type of *Ipomoea cynanchifolia* C. B. Cl. (*Wallich* 1399 (G, K). Another species which is very similar is *C. ebracteatus* Desr. the type of which is preserved in the Lamarck herbarium at Paris (no. 1784). It is bristly-pubescent all over; the flowers are white with purple stigmas; the corolla is 9 mm. long; the pedicels 4 mm. long and the ovate-elliptic sepals 5 mm. long and 3 mm. wide. Choisy has made the necessary combination in *Ipomoea*. The species was described from America and is only another variety of *I. plebeia*. Plants of *I. plebeia* subsp. *africana* have been misidentified with *I. cardiosepala* Hochst. ex Choisy (i.e. *I. sinensis* subsp. *blepharosepala* ([Hochst. ex.] A. Rich.) Verdcourt) in the Flora Capensis where the three Natal specimens mentioned above were all cited as that plant. The known distribution of subsp. *africana* is shown in fig. 1.

I. plebeia R. Br., Prodr. 484 (1810) subsp. **indica** Verdcourt-subsp. et nom. nov.; a typo sepalis angustioribus acuminatis, corolla rosea differt.

Convolvulus cynanchifolius Wall. Cat. n. 1399 *non* [Willd. ex] Roem. and Schult.

Ipomoea cynanchifolia [Wall. ex] C. B. Cl. in Hook., Fl. Brit. Ind. **4** : 208 (1883) *non* Meissn.

The type of my subspecies is the same as that of *I. cynanchifolia* C. B. Cl. (Wallich 1399 pp.). The Indian plant differs from typical *I. plebeia* far more than subsp. *africana* does.

I. polymorpha *Roem. & Schult.*, Syst. **4,** 254 (1819).

I. heterophylla R. Br., Prodr. 487 (1810), non Ortega.

I. commatophylla [Steud. ex] A. Rich., Tent. Fl. Abyss. **2,** 65 (1851).

A study of the types of the latter two names shows them to be synonymous as was suggested by Hallier f. and I follow van Ooststroom (see Fl. Malesiana, ser. 1, **4,** 464 (1953)) in his choice of a new name for *I. heterophylla* which is unfortunately invalid.

I. oenotherae (*Vatke*) *Hallier f.* in Engl., Bot. Jahrb. **18,** 125 (1893) var. **angustifolia** (*Oliv.*) *Verdcourt* comb. nov.

I. commatophylla [Steud. ex] A. Rich. var. *angustifolia* Oliv. in Trans. Linn. Soc. **29,** 116 (1875).

The thick rootstock and very divided leaves indicate that Oliver's variety is better placed under *I. oenotherae*, from typical forms of which it merely differs by its smaller flowers and less swollen root (in most cases). I do not consider that it merits specific rank, as has been suggested on the covers at Kew.

I. kotschyana [*Hochst. ex*] *Choisy* in DC. Prodr. **9,** 354 (1845).

Kenya. Kilifi District: Malindi, Oct. 1951, *Tweedie* 1057 (K) and same locality, on sandy ground amongst grass just behind sands, sea level, 24 June 1956, *Irwin* 273 (EA, K): sends out branches from a central plant, flowers pink with dark centre, opening after 5.30 p.m.

Tanganyika. Kiserawe District: Pugu Hills, Msassani, grassy banks on sandy soil, sea level, 30 May 1939, *Vaughan* 2815 (EA, BM): tiny prostrate herb with pale pink flowers.

FIG. 1. Distribution of *Ipomoea plebeja* R. Br. ssp. *africana* Meuse.

The specimens cited above, first records for the territories concerned, were at first considered to represent a new coastal species but this is not so. The ovate part of the sepals often has a lateral expansion on either side. Further work is needed to see if *I. polymorpha* and *I. kotschyana* are constantly 4- and 6-valved in fruit. It is fairly certain that they are. Three-loculed ovaries and capsules are quite uncommon in *Ipomoea*. The only other truly indigenous African species which have them are *I. coptica* (L.) Roem. & Schult. and *I. ticcopa* Verdcourt sp. nov. described below. The 'Morning Glories' also have 6-seeded capsules.

I. asperifolia Hallier f. complex.

There is a complex of forms, centred about this species, which occurs mainly in Angola, Rhodesia, Nyasaland and the Belgian Congo; it penetrates Southern Tanganyika as do many other plants with similar distributions. This complex has not been thoroughly studied in connection with the present flora, since adequate material is not available. It will have to be elucidated thoroughly when the *Convolvulaceae* are worked out for the Flora of the Belgian Congo and the Flora Zambesiaca. The complex contains *I. blepharophylla* Hallier f., *I. scotelli* Rendle, *I. porrecta* Rendle & Britten and others. As mentioned by Brenan (Mem. New York Bot. Gard. **9** (1), 7 (1954), there are some difficult members of this complex in Nyasaland. Since the material available is not really adequate, it is certain that my treatment of the East African forms will be altered on further study. One difficulty is that the members of this complex start as small plants flowering after burns and afterwards the shoots elongate considerably. This renders it difficult to compare single specimens, e.g. types which are not in uniform states of development. Ranges of material are necessary.

I. asperifolia *Hallier f.* in Engl., Bot. Jahrb. **18,** 128 (1893). var.

I am leaving this variety undescribed until more material is to hand. It has shorter, narrower sepals than the type, and differs from *I. blepharophylla*, to which it is almost equally close, in its smaller flowers and more hairy subhastate leaves.

Tanganyika. Iringa District: Iheme, 1800 m., Nov. 1933, *E. Ward* 35 (EA): creeping herb with pinky-mauve flowers.

Nyasaland. Dedza District: Dedza, *Brachystegia* woodland, *Brass* 17637 (K): perennial herb 4–7 cm. tall, flowers pink, young shoots flowering after the burning of the grass.

I. heterocalyx *Schulze-Menz* in Notizbl. Bot. Gart. Berlin **14,** 110 (1938).

?*I. ledermannii* Pilger in Engl., Bot. Jahrb. **48,** 351 (1912).

I. dehniae Merxmüller in Trans. Rhod. Sci. Assoc. **43,** 39 (1951).

I am adopting this name for a plant which has been collected but rarely in Tanganyika and Rhodesia. It is closely allied to *I. blepharophylla* and to *I. asperifolia* and should perhaps be considered a variety of one of them, probably of the former, since it has a long corolla. The material I have seen of *I. crassipes* Hook. var. *hirta* Hallier f. is also referable to or very near the present species, or to *I. asperifolia*. *Baum* 151 and other sheets referred to that variety have very short peduncles 0·5 cm. long, but *Baum* 454 is undoubtedly the same form and has a peduncle 7 cm. long. The stiff yellow indumentum is not like that of *I. crassipes*. *I. fulvicaulis* ([Hochst. ex] A. Rich.) [Poiss. ex] Hallier f. is also very close to this complex differing only in the larger bracts. There are a large number of unnamed plants in the herbarium at Brussels belonging to this affinity, many referable to *I. hypoxantha* Hallier f.

I have not seen the type of *I. ledermannii* which was destroyed during the War but *Schlieben* 6051 was distributed from Berlin under this name. Pilger, however, referred his new species to near *I. barteri* Baker*, a totally different species in section *Erpipomoea*, which makes it doubtful if the Schlieben sheet

* A species unique amongst the African members of the genus because of its 10-seeded capsule.

was correctly named; the description would fit however. *Schlieben* 6051 differs from the type of *I. heterocalyx* in having more glabrous leaves and a narrower corolla-tube; the sepals are also larger. Merxmüller compared *I. dehniae* with *I. blepharophylla* Hallier f. and *I. debeerstii* De Wild. He could not have seen the latter species since it does not belong to the section *Calycanthemum* at all but to section *Erpipomoea* (=*Leiocalyx*) where it comes near to *I. transvaalensis* Meeuse (=*I. convolvuloides* Hallier f.) and a new species, *I. milnei*, which I have described elsewhere*.

Tanganyika. Morogoro District: Uluguru Mts., savanna hills, a climber in grass, 300 m., 14 Jan. 1933, *Schlieben* 3250 (B, holotype†, BR, isotype): flowers lilac. Lindi District: Mbemkuru, 100 km. N.W. of Lindi, 21 Nov. 1935, *Schlieben* 6051 (BM, BR, G, P).

Southern Rhodesia. Marandellas, dry vlei, 7 Dec. 1940, *Dehn* 196 (BR, K, isotypes of *I. dehniae*.)

I. tenuirostris [*Steud. ex*] *Choisy* in DC., Prodr. **9,** 379 (1845) subsp. **hindeana** (*Rendle*) *Verdcourt* comb. nov.

I. hindeana Rendle in Journ. Bot. (London) **39,** 13 (1901).

The type of *I. hindeana* is a dwarf plant flowering when only 7 cm. tall. It is, however, identical with other plants having much larger trailing shoots. It is possible that the form always flowers when small but the type may be abnormal. Although there are indumentum differences obvious to the eye it cannot be maintained as distinct from *I. tenuirostris*. The three Greenway sheets cited below are intermediate with the typical form.

Kenya. Machakos, *Hinde* (BM, holotype). Athi Plains, sandy cliff, 1680 m., 13 Dec. 1930, *Napier* 574 (EA): flowers pure white, stigma purple, a little purple at the base of throat inside.

Tanganyika. Moshi District: Ngare Nairobi, in *Pennisetum massaicum* grassland, 1200 m., 14 Sept. 1954, *Robson* 104 (EA): climbing over grass tufts, flowers pure white. Masai District: Monduli, Ardai Plains, on black cracking loam of volcanic origin, 1440 m., 26 June 1944, *Greenway* 6974 (EA, K): a white-flowered, perennial, procumbent herb; rare in *Oxygonum, Commelina, Acalypha, Kohautia, Aristida, Senecio, Emilia* association; same locality, greyish-chocolate, much cracked and puddled volcanic clay, 27 June 1944, *Greenway* EAH 9280 (EA); same locality, dark greyish-black, heavy, clayey loam of volcanic origin, 1350 m., 30 June 1945, *Greenway* 7512 (EA, K): a white-flowered perennial climbing herb, locally common with *Brachiaria eruciformis, Commelina, Leucas* and *Heterocarpha haareri*.

A member of the staff of the East African Herbarium has recently collected a plant in northern Kenya which can only be referred to a subsp. of *I. tenuirostris*:—

I. tenuirostris [*Steud.* ex] *Choisy* subsp. **repens** *Verdcourt* subsp. nov.; a planta typica habitu procumbente, foliis oblongo-ovatis vel orbicularibus differt.

Ethiopia. Elolo, 3 Aug. 1939, *Corradi* 2474, 2475, 2476, 2556, 2576 (FI). Lake Rudolf near Coro, 8 Aug. 1939, *Corradi* 2544 (FI).

Kenya. Turkana District: 128 km. N. of Lodwar, lava desert with sparse trees and scrub, 750 m., 22 May 1953, *Padwa* 193 (EA, holotype of subspecies, K & PRE, isotypes): flowers white.

It is a small plant 9–36 cm. in extent with a narrow, unbranched, main root possibly from a tuber. In small plants the stems are suberect and the plant is almost of the rosette type. In other plants, the stem elongates but is simple; even then many leaves remain clustered around the original point of emergence. The stems are whitish-pubescent with internodes 0–4 cm. long. The leaves are ovate-oblong to almost orbicular, with a wide sinus at the base

* Hook. Ic. Pl. t. 3556 (1956).

and rounded basal lobes, rounded and very blunt at the apex, 3–4·5 cm. long and 1·6–4·3 cm. wide; the lamina is silky when young but only obscurely pubescent when mature; the petiole is 3–6·5 cm. long, pubescent. Peduncles 2·5–5·4 cm. long, 1–2-flowered, pubescent; bracts minute; pedicels 1·6–2·1 cm. long. Sepals lanceolate to ovate, narrowed above, 7–10 mm. long and 1·5–2·5 mm. wide. Corolla narrowly infundibuliform, 3·7 cm. long, pubescent outside, white with a purple centre.

The I. sinensis (Desr.) Choisy aggregate.

It has long been assumed that the plant, which in East Africa has usually been known as *I. cardiosepala* [Hochst. ex] Choisy, *non* Meissn., was identical with a plant common in India often called *Aniseia calycina* (Roxb.) Choisy. A comparison of the types shows, however, that they are at least subspecifically distinct. N. E. Brown, in an MS. note on the covers at Kew, recorded the same opinion, only he would have separated them as distinct species. The Indian plant has much broader and coarser sepals. Further searching has, however, shown that this plant also occurs in Tropical Africa where it has been renamed *I. auxocalyx* by Pilger. The African form with small sepals is in need of another name and the one available is *I. blepharosepala* [Hochst. ex] A. Rich. by which name it was also frequently called before being synonymised with the Indian plant. The latter has been called *I. hardwickii* (Spreng.) Sweet, since the epithet *calycina* is preoccupied in *Ipomoea*. The basinym of this is *Convolvulus hardwickii* Sprengel a superfluous name change for *C. calycinus* Roxb. which is a perfectly valid earlier name. There is however an altogether earlier name *C. sinensis* Desr. which must be adopted.

The two subspecies may be distinguished as follows:—

Fruiting sepals ovate-lanceolate, cordate at the base, long-acuminate at the apex, 17–20 mm. long and 6–7·5 mm. wide . *I. sinensis* subsp. *sinensis*

Fruiting sepals linear-lanceolate to narrowly triangular with the base broadened, cordate or hastate, 4–8 mm. long and 3–6 mm. wide *I. sinensis* subsp. *blepharosepala*

I. sinensis (*Desr.*) *Choisy* in Mém. Phys. Soc. Genève **6,** 459, (1834) (n.v.).

Convolvulus sinensis Desr. in Lam., Encycl. **3,** 557 (1791).

C. calycinus Roxb. Fl. Ind. (ed. Carey et Wall.) **2,** 51 (1824).

C. hardwickii Sprengel, Syst. Veg. **4** (2), 60 (1827).

Ipomoea hardwickii (Sprengel) Sweet, Hort. Brit., ed. 2, 372 (1830); Hemsley in Journ. Linn. Soc. Bot., **26,** 160 (1890).

Aniseia calycina (Roxb.) Choisy in Mém. Soc. Phys. Genève **6,** 482 (1834) & in DC., Prod. **9,** 429 (1845).

Ipomoea auxocalyx Pilger in Notizbl. Bot. Gart. Berlin **11,** 819 (1933).

Tanganyika. Mahenge, Rupia, Mberere Mts., 'Trockenwald', 400 m., June 1932, *Schlieben* 2405 (BM, BR, G, K & P, isotypes of *I. auxocalyx*): 'windend an einem Uferstrauch an einem kleinem Bach'. Kihumbati, 140 miles W. of Lindi, 460 m., 20 April 1935, *Schlieben* 6317 (BR, P): flowers white. (N.B. This sheet is an exact match of *Wallich* 2255 (the type of *C. calycinus*)).

Portuguese East Africa. Baroma on R. Zambesi, Msusa, 210 m., 25 July 1950, *Chase* 2798 (K, SGH): flowers white and Boruma (presumably the same locality), April 1892, *Menyharth* 1087 (K).

Northern Rhodesia. Mumbwa, 15°S., 28°E., 1911, *Macaulay* 722 (K). Gwembe Valley, Zangwe River, near Vwa's village, in alluvial thicket, 1 April 1952, *F. White* 2386 (EA, FHO): herbaceous twiner 1·5 m. high with white flowers. Mapanza Mission, 1050 m., 22 March 1953, *E. A. Robinson* 144 (K): in dry grassland similar to 131 but flowers larger, fruit not turning purple.

Southern Rhodesia. Wankie, Deka River, 21 June 1934, *Eyles* 7957 (BM, K, SGH): vine climbing over coarse riverside growth, flowers white.

I. sinensis (*Desr.*) *Choisy* subsp. **blepharosepala** ([*Hochst.* ex] *A. Rich.*) [*Verdcourt* ex] *Meeuse* in Bothalia **6,** 729 (1958).

I. cardiosepala [Hochst. ex] Choisy in DC., Prodr. **9,** 429 (1845) *nomen.*

I. blepharosepala [Hochst. ex] A. Rich., Tent. Fl. Abyss. **2,** 72 (1851).

I. hardwickii sensu auctt. afr. non (Sprengel) Sweet.

This sub-species is very widely distributed throughout tropical Africa and Arabia. Capua (Ann. Ist. Bot. Roma **8,** 227 (1903) divides this subspecies into three varieties which are, as Rendle stated in the F.T.A., unfounded.

Ipomoea section *Dasychaetia* Hallier f.

The typical species of this section is *I. linosepala* Hallier f. Besides this, two other species have been described—*I. alpina* Rendle (1912) and *I. hockii* De Wild. (1913). At first sight, all three appear distinct. *I. linosepala* has wide, ovate, oblong or obovate leaves, although some tend to be narrow. It is possible that many intermediates will be found between this and the narrow-leaved *I. alpina* but, at present, I prefer to leave them separate. *I. alpina* has short peduncles, linear to linear-lanceolate, rather sparsely, bristly pilose leaves and short glabrescent sepals. *I. hockii* has longer peduncles, linear-lanceolate leaves, narrowed strongly at the apex and densely woolly-pilose; the sepals are similarly hairy. I have, however, seen many intermediate sheets and, although my original idea was to found two or three varieties, it seems certain that abundant further material will demonstrate that simple 'sinking' is the best course. As is so often the case with these small herbs with numerous annual shoots from a woody rootstock, many characters vary over a wide range, e.g. leaf size, shape and spacing on the stem (leaves of 80 × 2 mm. and 40 × 18 mm. may be found on different plants); corolla length (18–37 mm.) and colour (white or yellow); bract length (6–20 mm.); sepal length (7·5–17 mm.); peduncle plus pedicel length (4–30 mm.) and indumentum (sparsely to very densely bristly pilose). A short erect plant, with leaves close together and long peduncles, appears quite distinct from a longer subdecumbent plant, with spaced leaves and subsessile flowers. Experience with plants with similar growth forms in this area indicates caution. Differences in climatic conditions cause considerable variation in this type of growth-form.

I. alpina *Rendle* in Journ. Bot. (London) **50,** 253 (1912).

I. hockii De Wild. in Fedde Repert. **11,** 539 (1913).

Tanganyika. Rungwe District: Kyimbila, Bundala, Namulapi, 2000 m., 3 March 1914, *Stolz* 2562 (BM, BR, K, PRE): flowers yellow. Njombe District: Kipengere Range West, top of mountain amongst grass, 2400 m. 14 Jan. 1957, *Richards* 7765 (EA, K): herb 12·5 cm. tall, flowers pale yellow with yellowy-green veining (erect). Sumbawanga District: Kaka River Falls, edge of woodland in sandy rocky ground, 1500 m., 30 Dec. 1956, *Richards* 7393 (K): flowers white.

Nyasaland. Nyika Mountains, 2100 m., Nov. 1932, *Sanderson* 88 (BM). Mt. Waller, 1350 m., Nov. 1932, *Sanderson* (BM).

Northern Rhodesia. Serenje, in seepage areas on sand between the rocks, 23 Jan. 1955, *Fanshawe* 1846 (K): tuberous-rooted sub-acaulous herb, flowers yellow-ochre. Abercorn District: Lufulu River plain, stony ground on escarpment, 2750 m., 19 Feb. 1957, *Richards* 8253 (K): semi-creeper, flowers lemon-yellow, fade when picked (internodes long) and above Lufulu River, in woodland on open, sandy, damp ground on escarpment, 2750 m., 19 Feb. 1957, *Richards* 8260 (K): woody stem, flowers yellow, fading quickly and Mpulungu Road, in sandy, stony, open space among flat rocks, 1470 m., 29 Dec. 1954, *Richards* 3770 (K): herb 12·5 cm. tall, leaves very downy, calyx deeply divided, hairy, flowers yellow, tubular (very hairy form like type of *I. hockii*).

Belgian Congo. Mt. Senga, near Lake Tanganyika, rocky overgrown precipices on mountain slope, 1500 m., 29 May 1908, *Kässner* 2909 (BM, holotype, BR, isotype). Katanga: Plateau de la Manika, Oct. 1911, *Hock* s.n. (BR, holotype of *I. hockii* De Wild.).

The I. involucrata P. Beauv. group.

The species in this group have been confused for some considerable time.

I. involucrata P. Beauv. and *I. pileata* Roxb. are quite distinct and readily separable by the shape of their corollas and also by some more subtle differences in the shape of the involucre. *I. pileata* has the tube of the corolla very narrow, only about 1·5–2 mm. wide at the base. It is widely distributed in East Africa and I have also seen specimens from Nyasaland, Rhodesia, and the Belgian Congo. The species is fairly constant. *I. involucrata* on the other hand is much more variable. A very hairy form was described as a separate species by C. H. Wright as *I. operosa*. When this has large cymbiform bracts incompletely joined to form an involucre and is densely villous it is distinctive, but there are numerous intermediates. I agree with Hallier f. (Engl. Bot. Jahrb. **30,** 387 (1901)) in reducing it to a variety. In Central Tanganyika there is another variety with smaller inflorescences having an involucre recalling that of *I. pileata*, 2–3 cm. wide and 1–2-flowered; the sepals and corolla are smaller.

I. involucrata Beauv., Fl. Oware, **2,** 52, t. 89 (1817) var. **operosa** (*C. H. Wright*) [*Hallier f. ex*] *Verdcourt*, comb. nov.

I. operosa C. H. Wright in Kew Bull. **1897,** 275 (1897).

I. involucrata *Beauv.*, Fl. Oware, **2,** 52, t. 89 (1817) var. **burttii** *Verdcourt*, var. nov.; ab *I. involucrata* var. *involucrata* inflorescentiis minoribus 1–2-floris, sepalis minoribus, 6 mm. longis et 1·5 mm. latis, corolla ± 2·3 cm. longa differt.

Tanganyika. Kondoa District: near Sambala, *Julbernardia-Brachystegia* woodland on sandy soil, 1470 m., 23 April 1929, *Burtt* 2155 (K, holotype of var., EA, isotype): pink-flowered small semi-climbing herb. Manyoni District: Kazikazi, 1260 m., 16 May 1932, *Burtt* 3638 (K, EA). Tabora District: Tabora, Talikwa, 1200 m., 21 April 1954, *Smith* 1138 (EA): climber with purple flowers.

Northern Rhodesia. Abercorn, Chilongowelo Drive, 1440 m., 2 April 1952, *Richards* 1380 (EA, K): flowers pure white.

Key to the Species and Varieties in the I. Involucrata Group

1. Bracts ovate-lanceolate, cuneate at the base and not united into an involucral cup . . . . . *I. delpierrei* De Wild.

1. Bracts united into an involucral cup 2

2. Corolla tube 1·5–2 mm. wide at the base . . . . *I. pileata* Roxb.

2. Corolla tube 4–10 mm. wide at the base 3

3. Plant densely villous; bracts often incompletely joined; inflorescence many-flowered
I. involucrata P. Beauv. var. *operosa* (C. H. Wright) [Hallier f. ex] Verdcourt

3. Plant less hairy; bracts always completely joined; inflorescence few- to many-flowered 4

4. Sepals small, 6 mm. long and 1·5 mm. wide; inflorescence 2–3-flowered
I. involucrata P. Beauv. var. *burttii* Verdcourt

4. Sepals large, 9–15 mm. long and 2–4 mm. wide; inflorescence 4-many-flowered . . . . . *I. involucrata* P. Beauv. var. *involucrata*

I. crepidiformis *Hallier* f. in Engl., Bot. Jahrb. **18,** 131 (1893) var. **microcephala** (*Hallier f.*) *Verdcourt* comb. nov.

I. microcephala Hallier f. in Engl., Bot. Jahrb. **18,** 131 (1893).

I. kassneri Pilger in Engl., Bot. Jahrb. **48,** 350 (27 Aug. 1912) non Rendle (1 Aug. 1912).

I. falcata R. E. Fries in Notizbl. Bot. Gart. Berlin **10,** 99 (1927).

I am unable to separate the above plants as more than a variety from *I. crepidiformis*. Var. *microcephala* is more often a perennial and the leaves are very densely white-pilose below.

I. argentaurata *Hallier f.* in Engl., Bot. Jahrb. **18,** 132 (1893).

I. decorsei Chevalier, Sudania **1,** 83, No. 5667 (1911), *nomen nudum.*

From a study of material preserved at Kew and Brussels the above synonymy was established.

I. wightii (*Wall.*) *Choisy* in Mém. Soc. Phys. Genève **6,** 470 (1834) and in DC., Prodr. **9,** 364 (1845), var. **kilimandschari** (*Dammer*) *Verdcourt*, comb. nov.

I. kilimandschari Dammer in Pflanzenwelt Ost-Afr. **C,** 332 (1895).

I. ficifolia Lindl. var. *laxiflora* Hallier f. subvar. *parviflora* Hallier f. in Engl., Bot. Jahrb. **28,** 35 (1899).

I. whyteana Rendle var. *integrata* Chiov. in Racc. Bot. Miss. Consolata Kenya, 85 (1935).

The *I. wightii* complex is a difficult one and contains *I. garckeana* Vatke (= *I. whyteana* Rendle), *I. wightii* (Wall.) Choisy, *I. elythrocephala* Hallier f., *I. ficifolia* Lindl. and *I. arachnosperma* Welw. (= *I. pilosa* (Roxb.) Sweet, non Houttuyn). There are intermediates between most of these plants but *I. kilimandschari* differs from *I. wightii* merely by the leaves being more usually entire than lobed and the white tomentum below being sparser and 'rucked up', rather than thick and uniform; the inflorescence is often laxer and fewer-flowered. Hallier's treatment may possibly be correct (so far as that word means anything in such a polymorphic group), since some *I. ficifolia* is very similar. Genetical work would be needed to reach final conclusions; the species grow easily from seed and would provide good

material for such an investigation. I am indebted to Father Piovano for loaning to me *Balbo* 739, the type of Chiovenda's variety, from the herbarium of the Consolata Mission in Turin.

I. pharbitiformis *Baker* in Kew Bull. **1895,** 291 (1895).

I. verdickii De Wild., Études Fl. Katanga, 113, t. 3 f. 9–16 (1903).

Since this species seems to have been misidentified on many occasions, it seems worthwhile to cite sheets in some detail. It has been confused with two such distinct species as *I. wightii* Choisy and *I. tenuirostris* Choisy, although the type is at Kew. Difficulties have probably arisen because this type had been laid away in the wrong place and also because it is not the most usual form of the species but is less floriferous and has narrower leaves. The species is related to *I. wightii* and not to *I. riparia* Don; it has glandular sepals and although the undersurfaces of the leaves vary from pubescent to densely hirsute, they entirely lack the typical arachnoid, close, white tomentum found in *I. wightii* and its allies. Rendle (F.T.A. **4** (2), 155 (1905) synonymises *I. verdickii* with *I. velutipes* [Welw. ex] Rendle but does not mention Verdick's specimen which he presumably did not see. N. E. Brown (*in adnot.*) has, for quite trivial reasons, suggested that the Congo sheets are not *I. pharbitiformis*, but I disagree; it is well-known that he frequently described species because wide distributions (such as are now daily being proved) were abhorrent to him.

Northern Rhodesia. Abercorn, on rocks under shrubs and trees at L. Chila outlet, 29 Sept. 1949, *Bullock* 1101 (EA, K): twining herb with bright mauve flowers. 81 km. south of Abercorn, patch of forest by spring, 18 July 1930, *Hutchinson & Gillett* 3823 (K): flowers pink. Mwinilunga District: R. Matonchi at Matonchi Farm, evergreen vegetation by river, 3 Sept. 1930, *Milne-Redhead* 1033 (K): strong climber over trees and shrubs, leaves grey-tomentose beneath; flowers mauve. Ndola, July 1904, *F. A. Rogers* 8365 (K). Lake Mwero (not Tanganyika as cited), 1894, *Carson* 41 (K, holotype).

Belgian Congo. Elizabethville, Lubumbashi, 11° 37′ S., 27° 24′ E., *F. A. Rogers* 10068 (BM, K), and July 1920, *F. A. Rogers* 26276 (K): Elizabethville, 17 July 1932, *Godman & Oldfield Thomas* 118 (BM); same locality, *Quarré* 374 & 724 (BR). Dilolo, by R. Mangoa, 23 July 1932, *Godman & Oldfield Thomas* 223 (BM) (a sheet with very dense indumentum on under surfaces of the leaves), and same area, R. Kamatui, 21 July 1932, *Godman & Oldfield Thomas* 163 (BM). Lukofu, 11 Aug. 1899, *Verdick* (BR, holotype of *I. verdickii*). Lomami, S. Mato, Mukishi, Sept. 1927, *Becquet* 39 (BR). Lukeni near Mutombo, Mukulu, June 1931, *Quarré* 2532 (BR). Grelco, Section 1, July 1931, *Quarré* 2562 (BR). Mt. Raponda, 1927, *Quarré* 524 (BM, BR, EA). Penge, 15 Feb. 1914, *Bequaert* (BR). Kundelungu, *Quarré* 5567 (BR). Kisanga valley, Aug. 1933, *Quarré* 3441 (BR).

I. camporum *A. Chev.* [Expl. Bot. Afr. Occ. Franç. **1,** 454 (1920) *nomen nudum*] *ex Hutch. & Dalz.*, Fl. W. Trop. Afr. **2,** 214, 215 (1931).

Someone at Kew has added the inexplicable MS. note to the cover of this species, that it is similar to *I. hellebarda* [Schweinf. ex] Hallier f. but there is no relationship, nor similarity. It is related to *I. pharbitiformis* Baker but has narrower sepals and smaller flowers. Further collecting may show it to be merely a western subspecies.

Sierra Leone. Musaia on bushes by stream, 19 Dec. 1946, *Deighton* 4481 (K): corolla white with mauve eye.

French Guinea. Cercle de Fararma (Faranna), Kaba, 10 Jan. 1909, *Chevalier* 20390 (K).

The I. obscura (L.) Ker Gawl. complex.

This group of species has always presented considerable difficulties due to the usual pair of causes—intrinsic difficulty and the multiplication of

species. In East Africa only two species are represented, *I. ochracea* G. Don and *I. obscura* and even these are perhaps too close together. Another species which rather resembles these two is *I. maxima* (L f.) [G. Don ex] Sweet not previously reported from East Africa under its correct name. This is a coastal or littoral plant common in Tropical Asia and also occurring in Kenya, Tanganyika and Zanzibar.

I. maxima (*L.f.*) [*G. Don* ex] *Sweet*, Hort. Brit. ed. 2, 372 (1830).

Convolvulus maximus L.f., Suppl. Pl. 137 (1781).

I. britteniana Rendle in Journ. Bot. (London) **34,** 38 (1896).

This species has a different inflorescence from that of either *I. obscura* or *I. ochracea*. The latter pair have either solitary flowers or, if the inflorescence is many flowered, then the pedicels are long. *I. maxima* has many-flowered inflorescences with short pedicels and is allied to *I. lapathifolia* Hallier f. and *I. hellebarda* [Schweinf. ex] Hallier f. The corolla-tube is narrow below and suddenly expanded above, white or pink. The type of *I. britteniana* is a poor specimen and differs somewhat from the Zanzibar material, the leaves being more scabrid and ciliate on the margins. *I. maxima* is, however, very variable in Malaysia. More material is needed from East Africa before it can be decided if it should form a distinct subspecies or variety.

Somalia. Uebi Scebeli, 16 Oct. 1934, *Ciferri* 74 (FI) & 24 Oct. 1934, *Ciferri* 108 (FI).

Kenya. Tana River District: Ngatana, plains by the R. Tana, 1893, *Gregory* (BM, holotype of *I. britteniana* Rendle).

Zanzibar. Mwera Swamp, 23 Nov. 1930, *Vaughan* 1693 (EA, K) and 16 Nov. 1930, *Vaughan* 1680 (EA, K): pure white flowers, open in the morning. Same locality, 4 Oct. 1930, *Vaughan* 1605 (EA, K): pink flowers, open in the morning.

A further plant occurring in East Africa is only varietally separable from *I. maxima*.

I. maxima (*L.f.*) [*G. Don ex*] *Sweet* var. **sagittata** *Verdcourt*, var. nov.; ab *I. maxima* var. *maxima* foliis anguste triangularibus vel lanceolatis, basi sagittatis, lobis angustis vel acutis differt.

Kenya. Kilifi District: Sokoke, 20 Sept. 1945, *Jeffery* 324 (EA).

Tanganyika. No locality, *Busse* 2648 (EA).

Zanzibar. Chaani Plain, 2 July 1933, *Vaughan* 2128 (EA, holotype of var., BM, isotype).

I. obscura (*L.*) *Ker Gawl.* in Bot. Reg. **3,** t. 239 (1817).

Convolvulus obscurus L., Sp. Pl., ed. 2, 220 (1762).

I. luteola R. Br., Prodr. 485 (1810).

I. fragilis Choisy in DC., Prodr. **9,** 372 (1845).

I. acutiflora A. Rich. Tent. Fl. Abyss. **2,** 71 (1851).

The types of all the above names have been seen and although, in some instances, the synonymy has been previously established, it has been thought worthy of confirmation. Several other names refer to hairy specimens of this species, mainly from Central and Southern Africa and I am dubious whether this hairy form is worth a varietal name or not. The taxa involved are *I. inconspicua* Bak., *I. fragilis* var. *pubescens* Hallier f. and *I. longipes* Engl. There are so many intermediates in hairiness, that I have not taken up any of these names for use in the East African Flora.

I. obscura (*L.*) *Ker Gawl.* var. **sagittifolia** *Verdcourt*, var. nov.; ab *I. obscura* typica foliis oblongis vel lineari-oblongis basi sagittatis, sepalis ovato-lanceolatis vel lanceolatis differt.

Tanganyika. Shinyanga, 1938, *Koritschoner* 1940 and 2098 (EA). Kahama District: 64 km. S. of Nungwe on Emin Pasha Gulf, 22 Nov. 1936, *Morgan* 10 (BM, holotype of var.).

The leaf-shape of this form is so different from that of typical *I. obscura* that a name is needed for it. The flowers are very similar save for slightly longer sepals. *I. demissa* Hallier f. in Engl., Bot. Jahrb. **18,** 129 (1893), based on *Böhm* 38 from Tanganyika, Unyamwesi, Gonda (B, holo†), is possibly the same as some of the intermediates connecting this variety with typical *I. obscura*. The leaves are described as ovate-cordate and the sepals are elongate. Rendle suggested that it belonged to the section *Calycanthemum* but Hallier f. (Engl., Bot. Jahrb. **28,** 38 (1899)) later placed it close to *I. obscura* and his statements on affinity are always extremely trustworthy. Topotypic material is required.

Hallier f. states (Engl., Bot. Jahrb. **18,** 140 (1893) that *I. triflora* Forsk. is identical with *I. obscura*. As C. Christensen states in his excellent account of Forskål's collection (Dansk Bot. Arkiv, **4** (3), 15 (1922)) the sheet labelled *I. triflora* is a mixture of two elements. The small part consisting of one leaf is possibly *I. obscura* but the major part to which the name obviously refers, is identical with the plant later described by Hallier f. as *I. gossypina*. This is discussed later. The sheet is shown in fig. 2. I am indebted to M. S. Christiansen and to the Keeper of the Botanical Museum, Copenhagen, for supplying this photograph and allowing it to be published.

I. ochracea (*Lindley*) *G. Don*, Gen. Syst. **4,** 270 (1837).

Convolvulus ochraceus Lindl. in Bot. Reg. t. 1060 (1827).

Ipomoea afra Choisy in DC., Prodr. **9,** 380 (1845).

I. kentrocarpa [Hochst. ex] A. Rich., Tent. Fl. Abyss. **2,** 70 (1851).

I. ophthalmantha Hallier f. in Engl., **18,** 141 (1893) p.p.

This is actually little more than a large *I. obscura* and the species which have been proposed, mainly on differences in colour, are not even varietally distinct. This species typically has 1-few-flowered inflorescences and the sepals are pubescent or glabrous. In the Belgian Congo, however, there are plants with many-flowered inflorescences and densely patent-pilose sepals. The inflorescence is considerably branched with long pedicels. The plant also occurs in West Africa where it was collected long ago by Thonning. This latter specimen, however, has flowers more the size of *I. obscura*. It is difficult to know where it should be placed—it is scarcely specifically distinct. The following names refer to the plant but I have not made any new combinations since I have not been able to study the plant thoroughly.

I. trichocalyx *Schum. & Thonn.*, Beskr. Guin. Pl. 91 (1828). (C, holotype).

I. micrantha var. *hispida* Hallier f. in Bull. Herb. Boiss. **6,** 542 (1898).

I have seen the three Congo sheets cited under the last mentioned name by Rendle in the Flora of Tropical Africa. From the description I believe that typical *I. micrantha* Hallier f. is a synonym of *I. obscura*. Cultural work is needed on the members of this complex; I am far from satisfied with my conclusions.

I. lapathifolia *Hallier* f. in Engl., Bot. Jahrb. **18,** 142 (1893) var. **dasyclada** (*Pilger*) *Verdcourt* comb. nov.

I. dasyclada Pilger in Engl., Bot. Jahrb. **41,** 297 (1908).

Tanganyika. Lushoto District: Makuyuni, June 1935, *Koritschoner* 755 (EA). Kilwa District: Kilwa, path to Ngerengere, *Busse* 3020 (B, holotype†, EA, BR, isotypes).

This variety differs from typical *I. lapathifolia* in its leaves, which are lanceolate to narrowly ovate-lanceolate. Pilger made much of the dense patent yellow hairs which are present in *Busse* 3020. After a careful study, I believe these are due to some pathological cause, because they are present only on the older parts of the stems. They cease abruptly at the base of the pedicels and peduncles and the youngest parts of the stems, which one would expect to be the most densely hairy, are in fact glabrous.*

I. stolonifera (*Cyrill.*) *J. F. Gmel.* Syst. Nat., ed. 13, **2,** 345 (1791).

This very widely distributed, pantropical, littoral plant has not as far as I am aware been recorded from the east coast of Africa.

Portuguese East Africa. Beira, on sand dunes about 3 km. from the port, sea level, 16 Feb. 1952, *Cooke* 3 (K): long white stems below surface in very hot sun; flowers open in full sun, white; leaves thick, bright green above, grey-green beneath.

I. pes-caprae (*L.*) *Sweet,* Hort. Suburb. Londin., 35 (1818) subsp. **pes-caprae.**

I. biloba Forsk., Fl. Aeg.-Arab. 44 (1775).

I was very surprised indeed to find that the sheet written up as this species in the Forskål Herbarium (no. 451) bore a specimen of *I. obscura* (L.) Ker Gawl. The locality, Arabia Felix, ad Zebid, 4–5, April 1763, is the type locality given in the description. The latter quite definitely reads 'foliis subrotundo bilobis', although it is true that it does not mention at which end of the leaf the lobing occurs! The description fits the usual conception of Forskål's species i.e. synonymity with *I. pes-caprae.* Christensen in his account of the collection makes no comments on the specimen. There is, however, a specimen of *I. biloba* in the British Museum from Forskål, which is the plant always associated with that name. I consider that the specimen at Copenhagen has been wrongly labelled and that the specimen in the British Museum should be selected as an accurately labelled isotype. The matter is fortunately one of no great importance since it is not a valid name.†

The following sheet from South Africa appears to be subsp. *pes-caprae* and not subsp. *brasiliensis* (L.) Ooststroom, the usual form on the coast of eastern Africa.

Natal. Zululand: Santa-Lucia, 320 km. N. of Durban, dunes, *Germain* 1534 (BR).

I. welwitschii [*Vatke* ex] *Hallier f.* in Engl., Bot. Jahrb. **18,** 146 (1893).

I. hystrix Hallier f. in Engl., Bot. Jahrb. **18,** 146 (1893).

I. welwitschii [Vatke ex] Hallier f. var. *latifolia* Britten in Journ. Bot. (Lond.) **32,** 85 (1894).

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* I have since seen a truly hairy form of this variant—this will be dealt with in a later paper.

† The information given by Meeuse (Bothalia **6**: 753 lines 31–33 (1958) under *I. aquatica* is erroneous and refers to *I. biloba.* This error was entirely my fault and not Dr. Meeuse's.

I. aspericaulis Bak. in Kew Bull. **1894,** 70 (1894).

I. semisecta Merxm. in Trans. Rhod. Sci. Assoc. **43,** 41 (1951).

The type of *I. welwitschii* (*Höpfner* 39 collected in South West Africa, JE, holo.) has now been seen by Dr. Meeuse and it is the wide-leaved form. Britten's varietal name is therefore superfluous since it refers to the typical form. I have seen an isotype of Merxmüller's species (*Dehn* 193a, BR) and believe it is merely a freak of *I. welwitschii* with trilobed leaves and is scarcely to be distinguished from the typical form. Many of the pyrophytic plants with woody rootstocks have incredibly variably leaves. *I. welwitschii* does not appear to have been recorded from the Sudan and the following record represents a considerable extension in range.

Sudan. Yirol District: around Joki Abbot, 6° 13′ N., 38° 05′ E., 17 April 1939, *Andrews* 421 (K): swollen root the size of a man's head, not edible; flowers purple; occasional; 'Menderi' (Jur).

I. (§Erpipomoea (= *Leiocalyx*)) **multinervia** *Verdcourt* sp. nov., ab omnibus speciebus africanis adhuc descriptis foliis linearibus et nervis lateralibus parallelis densissime approximatis (23–29/cm.) differt; ? affinis *I. schomburgkii* Choisy sed sepalis acutis distinguenda.

Herba perennis, glabra, caulibus decumbentibus supra striatis, complanatis levissime muriculatis basi rugulosis e radice tuberosa globosa usque 7 cm. diametro ortis. *Internodia* circiter 2 cm. longa. *Folia* linearia, usque 9–18 cm. longa et 0·4–0·45 cm. lata, apice subacuta, basi cuneata, petiolis 2 mm. longis; nervi laterales 11–14, costae parelleli, dense approximati. *Inflorescentiae* numerosae, axillares, 1–2-florae, pedunculis 8–18 mm. longis, pedicellis 5–8 mm. longis bracteisque lanceolatis 2–3 mm. longis et 0·5 mm. latis. *Sepala* lanceolata vel elliptica, coriacea, obscure nervia, ± minute papillata, subacuta, 11–13·5 mm. longa et 3·5–4 mm. lata. *Corolla* infundibuliformis, purpurea, 3·2–4·8 cm. longa, basi 0·65 cm. lata et apice 4 cm. lata. *Stamina* 5, inaequalia, filamentis 2·5–7·5 mm. longis, basi pilosis; antherae 3·2–3·5 mm. longae. *Ovarium* conicum, circiter 1·5 mm. altum, in stylum 8–13 mm. longum angustatum, stigmate bigloboso, 1·1 mm. lato. *Capsula* ignota.

Tanganyika. Shinyanga, 1938, *Koritschoner* 2013 (EA, K).

Northern Rhodesia. Nsama to Mporokoso, scattered in *Brachystegia* woodland, 25 Oct. 1949, *Bullock* 1372 (K, holotype): flowers bright mauve, rootstock as big as or bigger than a cricket ball.

This species bears some relationship to *I. welwitschii* but the densely nerved leaves readily distinguish it. The Guiana species *I. schomburgkii* is the only *Ipomoea* which I have seen with similar leaves. Dr. van Ooststroom, to whom I showed the poor Koritschoner sheet when I visited Leiden, suggested it might be a *Merremia* but the pollen grains are definitely spiny and the better *Bullock* sheet shows that the species has the characters of an *Ipomoea.*

Amongst the material of *I. coptica* (L.) [Roth ex] Roem. & Schult. preserved at Kew and Nairobi I found a species which, although resembling *I. coptica* in foliage very considerably, has a corolla of a completely different shape. The material available is rather scanty but there is sufficient to describe. The specific name is an anagram of that of its congener. From the description Hallier's variety quoted below is the same plant.

I. ticcopa *Verdcourt* sp. nov.

I. coptica (L.) [Roth ex] Roem. & Schult. var. *siphonantha* Hallier f. in Engl., Bot. Jahrb. **28,** 48 (1899).

Affinis *I. copticae* (L.) [Roth ex] Roem. & Schult., corollae tubo anguste cylindrico 1·8–2 cm. longo et 1·5–2 mm. diametro, foliorum lobis obovatis vel rotundatis, valde distincta.

Herba annua, ± glabra, caulibus stramineis, decumbentibus vel scandentibus, minute costatis. *Internodia* 1–8 cm. longa. *Folia* parva, ambitu rotundata, 2–3·5 cm. longa et lata, profunde palmatifida, lobis obovatis vel subrotundatis, basi anguste cuneatis, apice ambitu rotundatis, 1·5–2 cm. longis et 1–2·2 cm. latis, margine serratis, lobis inferioribus saepe bifidis; petioli 0·5–2·5 cm. longi. *Pedunculi* 1·5–2 cm. longi, saepe bialati, 1–2-flori; bracteae foliaceae, tripartitae, 12–20 mm. longae, lobis pinnatifidis, pedicellis 5–7 mm. longis. *Sepala* elliptica, ± obtusa; exteriora cuspidata, 6–7 mm. longa et 3–3·5 mm. lata, extra laevia, cristata vel verrucosa. *Corolla* hypocrateriformis, alba, tubo cylindrico 1·8–2 cm. longo et 1·5–2 mm. diametro, limbo ± infundibuliformi 9 mm. longo et 13 mm. lato. *Stamina* inaequalia, filamentis 13–17 mm. longis; antherae 1·5 mm. longae. *Stylus* filiformis, 16 mm. longus, stigmate trigloboso munitus. *Capsula* globosa, 6–7 mm. alta et lata, 3-locularis; semina circiter 6, brunnea, subtrigona, pubescentia, 3 mm. longa.

KENYA. Kilifi District: Malindi, Oct. 1951, *Tweedie* 982 (K).

TANGANYIKA. Dar-es-Salaam, Observation Hill, New Road, 8 April 1939, *Vaughan* 2793 (EA, holotype, BM, K, isotypes): flowers white. Without locality, but almost certainly Lindi District, 1903, *Busse* 2441 & 2826 (EA).

NATAL. Zululand, Lions Creek, 8 April 1898. *Schlechter* 12218 (B, holotype of var. *siphonantha*†)*.

I. coptica (L.) Roem. & Schult. has a small funnel-shaped corolla. The new species has a salver-shaped one with a long narrow tube. Its foliage is very similar in facies but the leaf lobes are much rounder. It would appear to be a rather rare species of the coastal region and is probably directly derived from *I. coptica*. The var. *acuta* Choisy of the latter is another coastal form resembling *I. ticcopa* in having large bracts, but the corolla is exactly that of typical *I. coptica*.

I. venosa (*Desr.*) *Roem. & Schult.*, Syst. **4,** 212 (1819).

Convolvulus venosus Desr. in Lam., Encycl. **3** : 566 (1791).

I. hornei Baker, Fl. Maurit. & Seychelles, 207 (1877).

I. petiolulata Schulze-Menz in Notizbl. Bot. Gart. Berl. **14,** 111 (1938).

I am unable to distinguish *I. petiolulata* from the Mascarene species, which seems to be very poorly represented in even the largest herbaria. I have seen both the holotype (P) and an isotype (C) of *I. venosa*.

TANGANYIKA. Lindi District: Mwera Plateau, 80 km. NW. of Lindi, 23 Feb. 1935, *Schlieben* 6054 (B, holotype† of *I. petiolulata*, isotypes at BM, BR, G, & P). Kiserawe District, Pugu Forest Reserve, June 1954, *Semsei* 1779 (EA, K).

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* Dr. Meeuse (*in litt.*) doubts the accuracy of this locality. From unquestionable evidence he believes the specimens were collected between Komatipoort and Lourenço Marques on 8 February 1898, i.e. in Portuguese East Africa.

I. irwinae *Verdcourt* sp. nov.

[*I. palmata* sensu Rendle in F.T.A. **4** (2), 178 (1905) quoad *Holst* 3127 (*non* Forsk.).]

Affinis *I. cairicae* (L.) Sweet foliorum lobis linearibus, floribus majoribus differt.

Herba perennis, caulibus glabris scandentibus minute muriculatis. *Internodia* 1–6 cm. longa. *Folia* ambitu rotundata, usque 3·5 cm. longa et 5 cm. lata, 7–9-palmatilobata vel biternate pedatilobata, lobis angustis linearibus apice acutis aristatis vel mucronulatis usque 3 cm. longis et 2–3 mm. latis; petioli muriculati, 1·5–2·5 cm. longi. *Inflorescentiae* axillares, 1-usque pauciflorae, pedunculis 0·5–1 cm. longis, pedicellis usque 2·4 cm. longis. *Sepala* elliptica vel suborbicularia, obtusa, interiora longiora, 4–6·3 mm. longa et 4 mm. lata. *Corolla* infundibuliformis, rosea vel purpurea, usque 6·5 cm. longa, tubo ± cylindrico 3·5 cm. longo et 1 cm. lato. *Stamina* inaequalia, filamentis 7–14·5 mm. longis; antherae 5 mm. longae. *Stylus* filiformis, 2 cm. longus, stigmate bilobato, 1·8 mm. longo. *Capsula* ignota.

KENYA. Kilifi District: Kibarani, grassland and bush on sandy soil, 22 Aug. 1945, *Jeffery* 49 (EA): flowers pale pink; Sokoke–Gange area, light bush on sandy soil, 22 Oct. 1949, *Jeffery* 693 (EA); Sokoke Forest, 29 July 1913, *Battiscombe* 773 (K); Malindi–Mombasa Road, on sand, sea level, 25 June 1956, *Irwin* 276 (EA, holotype, K, isotype): flowers purple. Mombasa District: Port Tudor, 1932, *MacNaughton* 83 (EA, K): climber with large and conspicuous purple flowers, not common but found all over the coast, 'Mlanyoko' (kiswah.); Mombasa, 6 Nov. 1910, *Gromier le Petit* (P).

TANGANYIKA. Tanga District: Moa, Bomandani, 11 km. S. of Moa, climbing on shrubs in evergreen thicket on coral rock by sea, 10 Aug. 1953, *Drummond & Hemsley* 3685 (EA, K): corolla mauve with dark mauve centre; Moa, *Holst* 3127 (K). Kilwa District: Kipatimu, Madumbiberge (?), 1912, *Meyer* in EAH 5175 (EA).

With the exception of the Irwin sheet which has been made the type, all the material is very poor indeed. Further material of this plant is needed. It has almost universally been misidentified as *I. cairica* (L.) Sweet but is very distinct. Hallier f. however, with his usual accuracy, noted the *Holst* sheet as a new species.

I. dasysperma *Jacq.*, Eclog. **1,** 132, t. 89 (1816) var. **odontosepala** (*Baker*) *Verdcourt* comb. nov.

I. odontosepala Baker in Kew Bull. **1894,** 73 (1894).

I. saccata Hallier f. in Engl., Bot. Jahrb. **28,** 48 (1899).

The Tanganyikan plant described by Baker does not differ appreciably from *I. dasysperma* Jacq. From the description, *I. saccata* must be identical with Baker's species. The type has been destroyed but the type locality, Tubugwe, is near Mpwapwa where several collections have been made of var. *odontosepala*.

I. prismatosyphon *Welw.* in Ann. Conselho Ultram. **1858,** 585 (1859) var. **trifida** *Verdcourt* var. nov.; a planta typica foliis superioribus profunde trifidis, lobo intermedio oblanceolato usque obovato-oblongo 8 cm. longo et 3·5 cm. lato basi angustato 0·5 cm. lato, lobis lateralibus ± lineari-oblongis 4·5 cm. longis et 0·85 cm. latis, foliis inferioribus oblongo-subhastatis differt.

TANGANYIKA. Iringa District: Mbosi, 14 Nov. 1935, *Horsbrugh Porter* (BM, holotype of var.).

I have not traced this locality. There is one of the same name in Mbeya District and the plant may have been collected there.

I. liliiflora Fries described from *Fries* 1475 (U, holotype) collected in the Belgian Congo south of Lake Kivu, is probably a form of *I. prismatosyphon* Welw. but the leaves are slightly emarginate and the corolla-tube is very wide. Insufficient material is available of the species from throughout its range to decide about synonyms. *I. tessmannii* Pilger is another likely synonym.

I. verbascoidea *Choisy* in Mém. Soc. Phys. Genève **8,** 56 (1838) & in DC., Prodr. **9,** 356 (1845).

Acmostemon angolensis Pilger in Notizbl. Bot. Gart. Berlin **13,** 106 (1936).

Gossweiler 9448 (isotype of *A. angolensis*) and 10947 at Kew named as *Acmostemon angolensis* Pilger are forms of *I. verbascoidea* Choisy. They appear to be suberect but so also is the type of Choisy's species preserved at Paris and collected by the 'unknown collector' (da Silva) in Angola. The name *Acmostemon* is therefore equivalent to section *Eriospermum* of *Ipomoea*, particularly the subsection with species having large bracts.

I. hanningtoni (*Baker*) *Rendle* in F.T.A. **4** (2), 182 (1905); Brenan in Kew Bull. **1949,** 93 (1949).

Argyreia hanningtoni Baker in Kew Bull. **1894,** 67 (1894).

Ipomoea macrocalyx (Baker) Hallier f. var. *decalvata* Hallier f. in Engl., Bot. Jahrb. **28,** 51 (1899).

Several botanists have studied the single sheet on which the above names are based. Brenan followed Rendle in considering it a distinct species. Actually the sheet is a peculiar mixture of *I. macrosepala* Brenan (= *I. macrocalyx* (Baker) Hallier f.) and *I. prismatosyphon* Welw. There is a small leaf and corolla of the former species and two corollas, one with a glabrescent calyx about 2·2 cm. long, of the latter. The original description refers to both components and the name can be rejected as a *nomen confusum*. It is not really surprising that at least four botanists have subjected this sheet to critical examination and not spotted the mixture, since it was only after numerous examinations, that I realised its nature. It is only recently, moreover, that *I. prismatosyphon* has been recognised from Tanganyika.

I. triflora *Forsk.*, Fl. Aeg.-Arab. 44 (1775).

I. gossypina [Deflers ex] Hallier f. in Ann. Ist. Bot. Roma **7,** 231 (1898).

This species has been mentioned before in the discussion of the *I. obscura* complex and Forskål's type is figured in Fig. 2. The small separated leaf is perhaps *I. obscura*. The flowering shoot belongs to a rather rare species which was redescribed by Hallier f. as *I. gossypina*. The species occurs in Kenya, where it has been confused with the closely allied *I. shirambensis* Baker. It is, however, readily distinguished by its white or greenish-yellow flowers with a purple eye (not all crimson) and corolla tube not prominently narrowed below.

Kenya. Northern Frontier Province: Dandu, *Commiphora-Acacia* scrub on red sandy loam, 750 m., 6 June 1952, *Gillett* 13431 (EA, K, PRE): woody twiner, almost leafless at time of flowering, flowers greenish-yellow with crimson centres; 15 km. N. of Damassa Pan, 41° 24′ E., 3° 17′ N., red sandy loam over sandstone with *Commiphora-Acacia* scrub, 390 m., 30 May 1952, *Gillett* 13394 (EA, K): woody twiner, corolla greenish-yellow with dark purple centre; Moyale, Jan. 1957, *Huffnagel* in EA 11178 (EA).

I. tuba (*Schlecht.*) *G. Don*, Gen. Syst. **4,** 271 (1837); van Ooststroom in Blumea **3,** 575 (1940).

This very widely distributed, pantropical littoral plant has been persistently misidentified and very often confused with the quite dissimilar weeds of the section *Calonyction* of *Ipomoea*. It does not appear to have been recorded from W. Tropical Africa before. van Ooststroom has given a very adequate account of the plant's involved synonymy.

Gold Coast. Beach near Axim, March 1934, *Irvine* 2565 (K): a scrambling creeper with rather fleshy stems and leaves and large purple (*sic*) flowers.

Kenya. Kilifi District: sandy bank above high water marks, 5 Nov. 1945, *Jeffery* 381 (EA): flowers white; Kanamai, Dec. 1941, *Bally* 1894 (K): climber of the littoral with white nocturnal flowers; Kikambala, cliff edge, sea level, 20 June 1956, *Irwin* 260 (EA, K): flowers open 12 p.m.–2 a.m., white with pale yellow-green throat and midpetaline areas.

Tanganyika. Rufiji District: Mafia Island, Kanga to Miskitini, sea level, 15 Aug. 1937, *Greenway* 5111 (EA, K): a climbing perennial herb with white tubular flowers and 4-seeded fruits; locally common in *Sideroxylon, Xylocarpus, Diospyros, Terminalia fatraea* fringing bush on coral rock on the sea shore.

Zanzibar. Mfumbwe, near sea shore, 7 Feb. 1929, *Greenway* 1377 (EA, K): white flowered herb; without locality, *Vaughan* 1802 (BM).

Pemba. Mvumoni, coral cliffs, 19 Aug. 1929, *Vaughan* 543 (EA, K): flowers white; same locality, June 1928, *Vaughan* 357 (BM, EA).

Seychelles. Mahé, 1908, *Gardiner* (K). Aldabra, 1908, *Gardiner* (K) and ditto, Oct.–Dec. 1892, *Abbott* (K). Without locality, *Bojer* (K, *I. glaberrima* Boj. MS. vide Hook. Journ. Bot. **1,** 357 (1834)).

Mauritius. Ile des Egrettes, on coral, 1·5 m. above sea level, 4 March 1889, *H. H. Johnston* (K): corolla white with 5 pale yellow bands, fruits in August. Chagos Islands: Diego Garcia, *Bourne* (K); there is a note at Kew on the latter sheet that several other specimens including ones from Providence and Du Lise Islands were not kept.

The stems dry a peculiar straw colour with characteristic ridges and, once seen, sterile material can easily be recognised.

I. sultani *Chiov.*, Fl. Somala **1,** 234 (1929).

I have examined the holotype of this species which is a very poor specimen indeed with about 2–3 leaves and one detached flower. Although the other specimens cited have larger leaves I believe they are conspecific.

Somaliland Protectorate. Bihen, gypsum country with *Suaeda*, 2 June 1945, *Glover & Gilliland* 1033 (EA): 'Il Gal' (Somali). Between Hudin and Halin, in open plains, 25 Oct. 1944, *Glover & Gilliland* 121 (EA): small much-branched shrub with few semi-succulent leaves, flowers white or pink, eaten by camels and goats, 'Doa Aure' (Somali). Erigavo, Burrehar, gypsum and Guban country, in drier places, 1200 m., 7 Oct. 1941, *Peck* 252 (EA): roots bear small watery potato-like tubers which are eaten by the Somalis when in need of water; grazed by all stock; 'Il Gel' (Somali—literally the eye of a camel). Garadok, on gypsum, 14 June 1942, *Peck* Y 120 (EA): a low thick bush, grazed by all stock; 'Il Gal' (Somali).

Somalia. Sultanata di Obbia, between Adani and Urandi, 29 April 1924, *Puccioni and Stefanini* 502 (555) (FI, holotype).

I. kituiensis *Vatke* in Linnaea **43,** 511 (1882) var. **massaiensis** (*Pilger*) *Verdcourt* comb. nov.

I. massaiensis Pilger in Engl., Bot. Jahrb. **48,** 351 (1912).

The *Jaeger* specimens on which Pilger based his species have been destroyed but I am certain they were the same as specimens collected in the Kondoa and Dodoma areas by *Burtt* and *Vaughan*. *I. kituiensis* is very variable and I had considered separating off both short- and long-sepaled forms as varieties. Plants with long sepals about 2 cm. long are distinctive but every

Holotype of *Ipomoea triflora* Forskål. (Photo. by M. Skytte, Christiansen).

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intermediate occurs. The plants with short, broad, sepals are more distinctive and isolated and the above name has been retained for them.

Tanganyika. Kondoa District: Sambala, 1470 m., 28 March 1929, *B. D. Burtt* 2124 (K, neotype of *I. massaiensis*): semisucculent shrub of scandent habit often climbing to 6 m. over bushes; flowers white, with pink rays and centre, a very common species on dry, stony, hills, waste land and old cultivations; rootstock of swollen tubers; Kondoa, 23 April 1940, *Vaughan* 3109 (K, EA). Dodoma District: Between Dodoma and Mya, 19 Jan. 1938, *Pole Evans & Erens* 843 (K, PRE). Massai Steppe, probably south of Mt. Hanang, *Jaeger* 17 & 20 (B, syntypes†).

I. chrysosperma Hallier f., described from Somaliland, is very close to *I. kituiensis* but has much smaller sepals. *Verdcourt* 749 (West Suk) and *Glasgow* 4818 (Port Victoria) are somewhat intermediate.

The following species probably belongs to section *Eriospermum*. Miss Bruce compared her species with *I. nephrosepala* Chiov. the type of which I have seen. I have also seen the type of *I. citrina* but the excellent description itself leaves little doubt of its identity. The native name given by Robecchi-Bricchetti 'Giafehôh' could very easily be a variant of 'Dufeio' given by Peck.

I. citrina *Hallier f.* in Bull. Herb. Boiss. **6,** 547 (1898) and in Ann. Ist. Bot. Roma **7,** 233 (1898).

I. latisepala E. A. Bruce in Kew Bull. **1940,** 62 (1940).

Somaliland Protectorate. The Haud, in *Commiphora-Acacia* scrub, June 1952, *Popov* in EAH 10204 (EA). 10 miles E. of Kirit, gypsum country, 14 Oct. 1952, *C. F. Hemming* 175 (EA): woody herb to 1·2 m., 'Chader' (Somali). Ber–Kirit road, 22 Oct. 1944, *Glover & Gilliland* 177 (EA, K): bush to 0·9 m., amongst *Acacia*, flowers yellow with purple eye, 'Chader' (Somali). Haud and Nogal, gypsum soils, specimen collected at Ainabo, 900 m. 23 Sept. 1941, *Peck* 349 (EA): bush up to 1·2 m., plant not eaten by stock, 'Dufeio' (Somali).

Ethiopia. Wardere, June 1943, *Hummel* 142 (EA): shrub to 1·2 m. with light yellow flowers. Ogaden; near Scillave, sandy plains, 22 Nov. 1953, *Popov* 1102 (EA, K): common herb to 1·2 m., flowers yellow; El Rago, Nov. 1954, *Simmons* 99 (EA); Dagabur, Oct. 1953, *Ashall* 9 (EA); 32 km. N. of Scillave, 6° 19′ N., 44° 57′ E., open bush on stony gravel, 490 m., 12 April 1956, *Simmons* S159 (EA): shrub to 1·2 m., flowers pale lemon, 'Chafayo' (Somali)

TURBINA Raf.

Meeuse and van Ooststroom have adopted this genus for those species formerly included in *Ipomoea* which have indehiscent fruits. There is really little in common between the various species referred to *Turbina* other than the fruit character.

T. stenosiphon (*Hallier f.*) *Meeuse* in Bothalia **6,** 783 (1958) var. **pubescens** *Verdcourt* var. nov., a typo foliis utrinque pubescentibus differt.

Tanganyika. Shinyanga, 1938, *Koritschoner* 2163 (EA). Manyoni District, margin of riverine thicket, 1260 m., 3 May 1932, *B. D. Burtt* 3578 (K, holotype of var., EA, isotype): climber to 9 m. with masses of waxy-white flowers which have an egg-like scent.

Notes from the East African Herbarium: VIII*

Bernard Verdcourt

STERCULIACEAE

By a mental aberration it was made to appear in Notes III under *Sterculia tragacantha* Lindl. that this plant yielded a Gum Tragacanth identical with that obtained from *Astragalus*. This is quite untrue, but the gum could certainly be used commercially in E. Africa if sufficient were available.

LINACEAE

Nectaropetalum kaessneri *Engl.* in Engl., Bot. Jahrb. **34,** 151 (1904); Verdcourt in Kew Bull. **1954,** 35 (1954).

The following is the southernmost record for this species. The flowers of *N. carvalhoi* Engl. are larger.

Tanganyika. Creek near Dar-es-Salaam, March 1940, *Vaughan* 2946 (EA): shrub above highwater mark, rare, flowers white. Korogwe–Handeni road, 390 m., 14 Jan. 1954, *Faulkner* 1333 (EA, K): large bush with pure white strongly scented flowers, common on forest margin.

ERYTHROXYLACEAE

Erythroxylum platycladum *Boj.* in Ann. Sc. Nat. 2 Sér., **18,** 186 (1842).

There are two specimens of this in the E.A. Herbarium from Tanganyika (Mafia Island and Lindi). The following record from Kenya may be the first.

Kenya. Mkokoni–Ashwe, Kiunga Mudirate, March 1957, *Rawlins* 392 (EA, K): a low, spreading, very branched shrub with flattened stems.

Mr. Rawlins has recently collected fairly extensively in the much neglected areas in the northern coastal parts of Kenya (Lamu, Witu, Kiunga, etc.) and also on the islands of the coast (Lamu, Patte, Kui, Osine, etc.). He has made some very interesting discoveries, including many plants not recorded from Kenya, and a considerable number of apparently new species and some for which the genus cannot be determined. A list of some of the more interesting determined plants follows. One interesting but not unexpected observation can be made. The characteristic dune flora of Brava, Mogadishu, etc., which was described by Chiovenda extends into the north of Kenya and accounts for some of the new specific records. *Thylachium papillososcabrum* Chiov. e desc., *Polycarpaea spicata* Arn., *Salicornia pachystachya* [Bunge ex] Ung.-Sternb., *Psilotrichum sericeum* (Hook. f. in Benth. et Hook.) Dalz. e desc., *Bivinia jaubertii* Tul., *Senecio bellioides* Chiov. e desc., *Diodia cf. physotricha* Chiov., *Coldenia procumbens* L., *Solanum pampaninii* Chiov., e desc., *Cressa cretica* L., *Operculina turpethum* (L.) Manso, and *Pennisetum atrichum* Stapf and Hubbard.

SAPINDACEAE

Camptolepis ramiflora (*Taub.*) *Radlk.* in Engl. and Prantl, Nat. Pflanzenf. Nachtr. **3,** 207 (1907).

Tanganyika. Msassani, 18 Feb. 1939, *Vaughan* 2757 (EA): small tree, white flowers on the old wood, now coming into season.

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* Continued from K.B. **1958,** 217.

Melanodiscus africanus *Radlk.* in Sitzb. bayer. Akad. **20,** 244, 285 (1890) and in Pflanzenreich, **IV, 165,** Sapindac., 817 (1932); T.T.C.L. 559 (1949).

Radlkofer described this species from *Moloney* s.n. collected at Lagos (K): he mentioned that *Deininger* 1996 (B†) collected at Bagamoyo near Sumbo appears to be this species. It is very likely that the sheet cited below is the same plant as the *Deininger* one but it has been loaned to Kew and they kindly reported on a comparison with the type. There are differences in every organ, often small, but quite distinctive. The main differences are 5 as against no petals and 5 as against 4 sepals. It seems unlikely that the plants are conspecific but more material from both localities is needed. The appearance of an almost entirely W. African species on the coast of Tanganyika would be unusual but not altogether unprecedented.

Tanganyika. Pugu Hills, near Minaki, in thick bush, 22 Sept. 1940, *Vaughan* 3140 (EA): shrub with green flowers.

MELIANTHACEAE

Bersama abyssinica Fres. subsp. **abyssinica** var. **gracilipes** (*Mildbraed*) *Verdcourt* comb. nov.

Bersama gracilipes Mildbraed in Notizbl. Bot. Gart. Berlin, **11,** 668 (1932).

Isotypes of this taxon are preserved in the herbaria of the British Museum and Brussels. It is distinguished by the short inflorescences on long peduncles, long pedicels, crisp, raised venation and frutescent habit. It must stand close to the stock from which *B. rosea* Hoyle evolved. Only the type has been seen so it is probably only a very restricted local variant.

LOASACEAE

Kissenia spathulata [*R. Br.* ex] *T. Anders.* in Journ. Linn. Soc. **5,** Suppl. 1, 43 (1860); Dandy in Kew Bull. **1926,** 176 (1926).

Dandy mentions only a *Revoil* specimen from the African mainland so it may be of interest to record a specimen from Ethiopia, although, no doubt, further material has been collected since 1926.

Ethiopia. 99 km. from Assab on Dessie road, low lava hills, 540 m., 15 May 1957, *C. F. Hemming* 1242 (EA): bush to about 1 m. tall, leaves sandpapery, flowers white, very common. The sheet matches exactly in leaf shape with material from Mukalla.

RUBIACEAE

Pentanisia microphylla (*Franch.*) *Chiov.*, Fl. Somal. **1,** 193 (1929); Verdcourt in Bull. Jard. Bot. Brux. **22,** 279 (1952).

This plant which, at the time I monographed the genus, was virtually unknown has been collected recently by both Mr. P. R. O. Bally and Mr. Popov but not in ripe fruit.

Somalia. North, near Scusciuban, 16 Jan. 1957, *Popov* GP/57/27 (EA, K): woody herb to 1 m., flowers pinkish-white.

Somaliland Protectorate. N.E., 21 km. W. of Adado, maritime plains, on stony ground with scanty *Salsola* vegetation, 15 m., 25 Oct. 1956, *Bally* 11213 (EA, K): woody shrublet 0·3 m. tall and 0·6 m. in diam., flowers blue, tomentose or woolly. 8 km. E. of Mait, open stony plains with *Panicum turgidum* and other scanty vegetation, 15 m., 26 Oct. 1956, *Bally* 11228 (EA, K): flowers shorter than in 11213 but sepals, etc., hairier.

COMPOSITAE

Phyllactinia grantii *Benth. ex Oliv.* in Trans. Linn. Soc. **29,** 102, t. 68 (1873); Oliv. & Hiern, F.T.A. **3,** 442 (1877).

Until recently there was no material of this plant in the E.A. Herbarium under its correct name, what little there was having been placed at the end of *Dicoma*. Several sheets have now been added and since the plant is little-known but undoubtedly fairly common, the material available at EA. has been cited. A prominent character is the exceptionally fine serration of the leaf margins (approximately 21 per cm.). The holotype was collected by *Speke & Grant* at Mininga, which is near Bukene, north of Tabora and presumably in the Nzega District of Tanganyika. The plant does not seem to be viscid as mentioned in the F.T.A.

Tanganyika. Tabora District: Urambo, thin 'miombo', in drainage channel on grey, sandy, loam, 1080 m., 18 March 1949, *Anderson* 397 (EA): woody herb about 0·3 m. high, florets deep purplish-red; and same locality, by roadside, between cultivated fields and 'miombo' fringe, amongst long grass and regenerating *Diplorhynchus* and *Phyllanthus discoideus*, 1170 m., 25 March 1952, *Welch* 145 (EA): erect, ± branched herb up to 0·23 m., stems purple, upper parts white-tomentose, leaves light green above, white-tomentose beneath, involucre deep purple with white tomentum, ray and disc florets very deep blackish-purple. Talikwa, Tabora, edges of 'mbuga' in deciduous woodland, 1200 m., 6 April 1954, *Smith* 1106 (EA): small erect herb to 0·23 m., leaves pale green above, white beneath, flowers crimson. Unyamwesi, Kombe, westlich–Usinge, km. 1006, im 'Pori', 1100 m., 25 Jan. 1926, *Peter* 35565 (EA). Ugogo, Bez. Tabora, 4 June 1913, *Braun* 5392 (EA): 25–30 cm., flowers dark carmine.

SCROPHULARIACEAE

Campylanthus spinosus *Balf. f.* in Proc. Roy. Soc. Edinb. **12,** 84 (1883) & Trans. Roy. Soc. Edinb. **31,** 203, t. 61 (1888); Vierhapper, Beitr. Fl. Südarabiens und Sokotra, 134 (1907).

This was one of the many plants at one time considered endemic to Socotra and Abd el Kuri. Several of these have since proved to be common to either Somalia or Arabia. I have traced no record of the present species from Somalia so this one may be the first.

Somaliland Protectorate. Erigavo, very stony ground, 1500 m., 7 Sept. 1956, *Simmons* B 50 (EA, K): small woody plant 10 cm. tall with mauve flowers.

Socotra. Reiged, on stony slopes, 450 m., 4 April 1953, *Popov* GP/SO/353 (EA): woody herb with bright lilac or purplish flowers. Ras Katanahan, rocky hillside, 15 m., 18 Feb. 1953, *Popov* GP/SO/135 (EA): woody herb 0·5 m. tall.

It may be of interest to mention here that the E.A. Herbarium contains nearly 400 numbers from Socotra collected by Mr. Popov during the early part of 1953*.

JUNCACEAE

Juncus bufonius *L.* Sp. Pl. 328 (1753).

This species has recently appeared as a weed in Kenya. It could be indigenous but was probably introduced. It occurs in Ethiopia.

Kenya. Ol Joro Orok, masses as undergrowth in water-logged cereal land, 2400–2550 m., Dec. 1956, *G. R. Cunningham van Someren* 543 (EA, K). Gilgil, Kipipiri, Mananga, 16 Feb. 1956, *Sherwood* 36 (EA).

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* *Vide* Popov in Journ. Linn. Soc. Bot. **55,** 706–720 (1957) for an account of his visit to this island.

Notes from the East African Herbarium: IX*

A New Species of Gossypium from Central Tanganyika

J. B. Hutchinson and B. J. S. Lee
Cotton Research Station, Namulonge, Uganda.

MALVACEAE

In June, 1955, in a collection of plants sent by Mr. H. J. de S. Disney to the East African Herbarium for naming, was a wild cotton that appeared to be distinct from anything hitherto recorded in Africa. The specimen was sent on to the Cotton Research Station, Namulonge, for naming, and Mr. Disney kindly provided seed which he had had the forethought to collect when he collected the specimen.

The specimen was collected at Nondwa in the Dodoma district of central Tanganyika. The nearest previous record of a wild species of *Gossypium* is Sampson's collection of *G. somalense* (Guerke) J. B. Hutchinson, Silow & S. G. Stephens from the Tana River in northern Kenya. Morphologically also, it appeared that the new species probably belonged in the same group as *G. somalense*, and plants were therefore grown of the new species, and of *G. somalense* and *G. areysianum* (Defl.) J. B. Hutchinson, Silow & S. G. Stephens for comparison. Living material of *G. anomalum* Wawra & Peyritsch from the Sudan was also available in field plots.

There can be no doubt that this plant is a new species of *Gossypium*, and distinct from all hitherto known species. In recognition of the characteristic long calyx lobes it is proposed to name it *Gossypium longicalyx*.

Gossypium longicalyx *J. B. Hutchinson* et *B. J. S. Lee*, sp. nov. in sectione *Stocksiana* ab speciebus omnibus calycis lobis longioribus valde distincta.

Frutex parvus, ad 0·3 m. altus, ramosus, ramis suberectis vel procumbentibus, usque ± 1 m. longis rugulosis parce stellato-pubescentibus dense nigropunctatis; internodia 0·5–6 cm. longa. *Folia* petiolata, petiolis usque 3·5 cm. longis, parce pilosis et stellato-puberulis nigropunctatis; lamina cordata, apice acuminata, circiter 4·0–6 cm. longa et 3·5–5 cm. lata, margine obscure crenulata, utrinque pilis brevibus parce ornata, subtus dense nigropunctata; nervi laterales 3–4; stipulae caducae, 1 cm. longae et c. 2 mm. latae. *Involucri bracteae* cordatae, apice acuminatae, ± ciliatae, circiter 2 cm. longae et circiter 1·4 cm. latae, dense nigropunctatae. *Calycis tubus* campanulatus, 0·5 cm. longus, lobis 5 linearibus apice acuminatis ± pilosis circiter 1 cm. longis. *Petala* pallide flava, haud maculata, circiter 2·2 cm. longa, pubescentia. *Tubus staminеus* 1·2 cm. longus; antherae laxe aggregatae, filamentis ± 1 mm. longis. *Stigmata* clavata, apice coalita. *Capsula* parva, ovoidea, apice acuta, 1–1·5 cm. longa, ± scabrida, glanduloso-punctata, 3-locularis, loculis 2–3-spermis, suturis pilosis. *Semina* compressa, leviter angulata, indumento viridi-griseo obtecta.

* Continued from K.B. **1958,** 220.

Tanganyika. Dodoma District: Nondwa, on black cotton soil in *Terminalia–Combretum* scrub, below 900 m. 25th March, 1955, *Disney* 33 (EA, holo., K, iso., Cotton Research Station, Namulonge, iso.): plant about 0·3 m. high, lateral shoots inclined to run for several feet along the ground, flowers all pale yellow; common where present; and specimens cultivated at Namulonge, Uganda, in greenhouse from Nondwa seed have been deposited at EA, K and BM. Mr. H. J. de S. Disney has added a further record as follows: 'The cotton seems to like the shade of fairly dense bush as I found it again on 30th April, 1956 at Logi, about 5 miles west of Chipogoro, which is 65 miles south of Dodoma on the main road to Iringa and about 55 miles south east of Nondwa. Only a small patch was seen with flowers and green bolls. The bush was very dense and was chiefly *Acacia mellifera*, *A. kirkii*, and *A. stuhlmannii*; the altitude about 2,200 ft., soil light brown'.

Uganda. Bokora County, in *Acacia seyal–A. mellifera* community on black clay soil, 17 July 1957, *Wilson* 390 (EA, Namulonge, KAW, K) (this gathering turned up some time after the paper had been written).

The fruiting branches near the ends of the vegetative branches often develop more internodes than those produced earlier, giving the whole branch the appearance of a paniculate inflorescence. The greenhouse specimens have larger leaves and bracteoles.

Precise measurements of plant parts are apt to reflect the conditions of growth more than the morphology of the plant, and this is particularly so when the material under study includes specimens from the wild, and living plants grown under favourable conditions in the greenhouse. In the above description, therefore, approximate figures only are given. Below are summarised measurements (in mm.) made on the Nondwa isotype and on specimens grown in the Namulonge greenhouse from Nondwa seed.

	Nondwa type.	Namulonge green house.
Leaves	42 × 41–20 × 20	55 × 47–20 × 15
Involucral bracteoles (at flowering) ...	23 × 21–21 × 18	31 × 23–23 × 14
Calyx lobes ...	—	13–10 long
Corolla	22 long	24–21 long
Capsules	13 × 9–16 × 10	—

G. longicalyx is geographically nearest to the section *Stocksiana* which includes *G. stocksii* Mast., *G. areysianum* and *G. somalense*. Central Tanganyika makes a natural extension of the range of the section, which is from western Sind through Arabia to the northern Sudan, Somalia, and northern Kenya. Ecologically, central Tanganyika is not so dry as most of the rest of the range of the section, *G. somalense* occurs in the 5 in. rainfall belt in the northern Sudan, and both *G. stocksii* and *G. areysianum* are desert plants in Sind and southern Arabia respectively. At Dodoma the mean annual rainfall is about 22 in., and the '*Terminalia* tree with *Combretum* scrub' of the Nondwa site is a much more profuse vegetation than is found in the habitats of the other three species.

G. longicalyx resembles the species of Section *Stocksiana* in general appearance. The sprawling habit is like that of *G. stocksii*. The small, pale yellow flowers, the light green entire leaves and young stems fit in with the appearance of the species of the Section *Stocksiana*, and give the plant an aspect quite distinct from that of the other section (*Anomala*) found in Africa.

An interesting minor observation was that the three species known to belong to the Section *Stocksiana* and also *G. longicalyx* suffer crippling damage from a leaf spot (*Alternaria* spp.) at Namulonge, whereas *G. anomalum*, *G. herbaceum* L. race *africanum* (Watt) J. B. Hutch. & Ghose and the New World cottons are not seriously affected.

We are indebted to Mr. H. J. de S. Disney for providing specimens and seed of his original collection, and for the information on the locality and ecological situation in which the species occurs; also to Dr. B. Verdcourt for rearranging this note and providing the Latin description.

Cactus Guide.*—A large number of books for amateur growers of succulent plants has appeared during the last ten years, all of them giving similar cultural advice and most of them attempting to give descriptions of popular species in semi-popular style. And all of them include more or less serious errors of botanical fact.

This book is no exception to the general rule, but it is exceptional in its illustrations. These are rough line drawings of the type one is accustomed to in the 'strip' cultural instructions given in some of the popular weekly gardening papers. For many people they will serve their intended purpose but they are without artistic merit and lack botanical accuracy.

Chapter four deals with 'Uses of Cacti' but the 'uses' are mainly confined to house decoration in 'desertariums', 'novelty containers' and 'button gardens'. The last is described as predominantly a "ladies' hobby" and it would appear to be apt as the containers used are, apparently, the buttons from their discarded (?) coats.

Altogether, this is an amusing, well printed little book but at thirty shillings it is a somewhat expensive amusement.

A. A. Bullock.

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* 'Cactus Guide', by Ladislaus Cutak. Published by D. Van Nostrand Company, Inc., Princeton, New Jersey, Toronto, New York, London. 1956. 30s. 0d.

Drawings of British Plants.*—Part X of the publication under review contains the *Saxifragaceae* and *Crassulaceae*. The former family includes the genus *Ribes* which some botanists place in a separate family the *Grossulariaceae*. Part XI deals with the families *Droseraceae* to *Ficoidaceae* arranged in the sequence of Bentham and Hooker's Genera Plantarum although the *Hippuridaceae* and *Callitrichaceae* are included as separate families. One species is figured in black and white on each plate, which contains a life-like drawing of the habit and accurate dissections on a larger scale. The Latin name, authority, English name and notes on the colour are provided at the bottom of each page. The illustrations show all the clarity of the preceding nine parts.

R. A. Blakelock.

* Drawings of British Plants, Part X, Saxifragaceae and Crassulaceae, 33 plates, 8/6d. net, 1957; Part XI, Droseraceae–Ficoidaceae, 39 plates, 9/6 net, 1958, by Stella Ross-Craig London: G. Bell & Sons Ltd.

Flowers drawn from Nature.*—Gerard van Spaendonck, a Dutch flower painter and one of the greatest of all time, was born in 1746 at Tilburg, Holland, and died in 1822. He was originally known as a painter of miniatures, but later became a painter of flowers and acquired an immense reputation in this field. In Paris he was admitted to the Academy where in 1793 he became professor of iconographie at the Jardin des Plantes. His classes here were very popular and well attended. Spaendonck had the necessary skill to render his flower paintings from Nature with great truth and accuracy. Redouté was one of his pupils and in the words of Wilfrid Blunt he 'was in fact the populariser and exploiter of van Spaendonck's technical discoveries', and reaped the harvest which his master sowed. Van Spaendonck's published work is limited to a single album which appeared about 1800 entitled 'Fleurs dessinées d'après Nature' containing twenty-four splendid drawings. In the volume under review sixteen of these plates have been reproduced from an original copy of the album. The plates have been made by Messrs. Lohse of Frankfurt and printed in eight colour litho-offset with great skill and care thus retaining the delicacy of the stipple-work in the original engravings. They illustrate well-known garden flowers, namely, the tulip, anemone, lilac, paeony, mallow, rose, hyacinth, snapdragon, hollyhock, foxglove, cabbage rose, marigold, aster, bell-flower, iris and poppy. There is a brief account of each plant and an extremely interesting introduction by Wilfrid Blunt. This is an excellent book which not only pays tribute to a talented artist but also reflects great credit on the publishers who are to be congratulated on the high standard of production and the excellence of the typography and binding.

H. S. Marshall.

* *Gerard van Spaendonck*. 'Flowers drawn from Nature'. Edited by Wilfrid Blunt. Folio. Pp. 15 + 16 plates. (The Leslie Urquhart Press, Plaw Hatch Hall, Sharpthorne, Sussex). 4 gns.

Notes on Asiatic Grasses: XXXII*

Indopoa Bor, a new genus of Indian grasses

N. L. Bor

The species *Tripogon pauperculus* Stapf differs from all the other members of the genus in its perfect awn twisted at the base. In fact it only agrees with *Tripogon* Roem. et Schult. in its spicate inflorescence and in the lower glumes of the lateral spikelets being furnished with a blunt tooth on the side nearest to the rhachis. Detailed investigation of the rich material which was not available to Stapf at the time the species was described, revealed further differences which set it apart from its present congeners and justify its elevation to generic rank.

As stated the median nerve is prolonged into a perfect awn twisted at the base. Where it passes through the tissue of the lemma this nerve is very broad and, as the ovary matures it curves round and almost encloses the long slender caryopsis. The caryopsis itself is unique. It is very long in comparison to its diameter, is flinty in texture and decorated at the apex with a hyaline glabrous emarginate fleshy appendage. The anthers are exceedingly minute and the florets seem to be cleistogamous for the empty anthers are found enclosed with the mature caryopsis in the deep groove formed by the median nerve.

My colleague, Dr. Metcalfe, who investigated the anatomy of the leaves considers that the micro-hairs of the leaves strongly suggest those of the *Chlorideae*, while the silica-bodies have a marked resemblance to those of *Bouteloua curtipendula*, itself a member of that tribe. The leaf-anatomy also resembles that of *Eragrostiella*, a genus which like *Indopoa*, was up till now, considered to be a member of the *Eragrosteae*. If these two genera were to be transferred to *Chlorideae* on anatomical grounds alone, it would introduce the completely anomalous feature of a several-flowered spikelet into the tribe, so they must remain where they are for the present. Dr. Metcalfe reports that the starch grains are of two kinds (a) globose and simple and (b) in pairs, each grain being dome shaped with a flat base. The two grains are joined by the flat surfaces.

Indopoa *N. L. Bor.* Genus novum ut videtur *Eragrostearum*, nullo genere tribus hujus revera affine, sed ab omnibus spiculis plurifloribus, caryopsidi longa, dura, fragili, apici lobo carnoso praeditum, distinctum. *Spiculae* omnes similes (gluma inferior spiculae terminalis longior), a latere visae cuneatae, alternae, in continuae rhacheos angulatae sulcataeque nodis solitariae spiciformes, appressae, pauciflores; rhachilla supra glumas et inter anthoecia disarticulans, superne anthoecio vestigiale coronata. *Glumae* inaequales (inferior multo brevior, obliqua, infra apicem altero margine dente obtusa praedita) hyalinae, 1-nerves, carinis scaberulae, breve mucronatae. *Lemma* oblongum, 2-lobatum lobis breve aristatis, 3-nerve; nervus medianus latus, maturam caryopsidem arcte amplectens, in aristam perfectam producta; *arista* basi torta; palea oblanceolata, 2-carinata, carinis

brevissime ciliata; *stamina* tria; antherae minutissimae, cleistogamae; *ovarium* stylis duobus stigmatibus plumosis; caryopsis longa, gracilis, dura, fragilis, apici lobo carnoso praedita; *lodiculae* 2, cuneatae, truncatae; *embryo* brevis; *hilum* punctiforme.

Species adhuc unica, Indiae incola.

Indopoa paupercula (*Stapf*) *Bor*, comb. nov.

Tripogon pauperculus Stapf in Hook. f., Fl. Brit. Ind. **7**, 285 (1896).

Gramen annuum, gregarium, muscorum incolum, interdum epiphyticum. *Culmi* cum inflorescentia usque 16 cm. alti, teretes, laeves glabrique, 1–2-nodes. *Foliorum laminae* usque 12 cm. longae, 1–2 mm. latae, involutae, supra brevissime pilosae, infra laeves glabraeque; *vaginae* culmos arcte complectentes, laeves, glabrae, striatae, supremae interdum spathiformes laminis redactis; *ligula* membranacea, 0·5 mm. lata, haud ciliata, margine rotundata.

Inflorescentia spiciformis usque 8 cm. longa; rhachis continua, angulata, sulcata. *Spiculae* in nodis rhacheos sessiles, alternae, a latere visae cuneatae, 4–6-flores. *Gluma inferior* spiculae terminalis paulo brevior quam superiorem; ea spiculae lateralis 2·5 mm. longa, obliqua, 1-nervis, hyalina, altero margine apicem versus dente obtusa praedita, breve mucronata; *gluma superior* 4·5–5 mm. longa, 1-nervis, acuminata, breve aristata vel mucronata, laevis, glabraque. *Lemma inferius* callo barbato 0·5 mm. longo, usque sulcam 6 mm. longum, 2-lobatum, 3-nerve; lobi scabri in aristam brevem 4 mm. longam producti; nervus medianus in aristam perfectam 14 mm. longam productus, latus, caryopsidem maturam arcte amplectens; arista basi torta; *palea* oblanceolata, 4 mm. longa, bicarinata, carinis brevissime ciliata; *stamina* 3; *antherae* 0·25–0·3 mm. longae; *styli* 2, graciles; *stigmata* plumosa; *caryopsis* 3–4·5 mm. longa, gracilis nervo mediano curvato complecta, apici lobo hyalino, carnoso praedita; *embryo* parvus; *hilum* punctiforme.

Ind. Or.: Bombay; Crest of Western Ghats, 20.9.1895, *G. M. Woodrow*; grows on old *Ficus glomerata* trees in company with mosses and *Utricularia orbiculata* (type, K); Khandala, Sept. 1919, *C. McCann*—on rocks; Castle Rock, 2000 ft., Oct. 1908, *A. Meebold* 10750.

Madras; Travancore, Peermade, 17 Oct. 1916, *Venkoba Rao*; Brahmagiri, 15 Nov. 1934, *E. Barnes* 862; Mysore, Talguppa, *A. Meebold* 10749—in quantities on flat rocks; Kulhutty Bababuden, Nov. 1908, *A. Meebold* 10748.

* Continued from Kew Bull. 1957 : 427 (1958).

A New Species of Thelephora from Malaya

by Derek A. Reid

Thelephora ramarioides *Reid*, sp. nov.

Sporophora usque ad 5·5 cm. alta, solitaria vel gregaria, purpureo-brunnea, apices versus pallida; rami numerosi, congesti; ramuli subulati. *Caro* purpureo-brunnea. *Hyphae* subhyalinae vel pallido-brunneae, 3–5μ latae, fibulatae, muris tandem plus minus crassis. *Basidia* quadri vel bispora, 26–44·2 × 8–11μ. *Sterigmata* usque ad 7 × 2·5μ. *Sporae* diversae angulatae, brunneae, 9–12 (–14) × 6–7·5 (–9)μ, spinulis minutis ornatae.

TYPUS: Malaya, Pahang, Bebar, *E. J. H. Corner*, 14.7.1932 (No. 751).

Fig. 1. *Thelephora ramarioides*. (*a*) sterile elements from the hymenium of collection No. 1485, (*b*) basidia from type specimen, (*c*) spores from type specimen.

Sporophores solitary or gregarious, up to 5·5 cm. high, repeatedly branched almost from ground level, chocolate brown becoming pallid toward the apices. Branches numerous, crowded, terete except at dichotomies and polychotomies where there is considerable flattening, apices subulate. Mycelium at base of fruitbodies binding the soil into a compact ball or pseudorhiza. *Flesh* chocolate-brown. *Hymenium* amphigenous or almost so, probably thickening, reaching 130μ in width. *Hyphal Structure* monomitic. *Hyphae* subhyaline, to pale brown, 3–5μ wide, branched, septate, clamped, with walls becoming thickened except in the region of the hymenium. The hyphae, which are arranged more or less longitudinally in the flesh, fre-

quently branch from clamp connexions and may be secondarily septate. *Basidia* 26–44·2 × 8–11μ with two or four incurved sterigmata up to 7μ long and 2·5μ wide at the base. *Spores* 9–12 (–14) × 6–7·5 (–9)μ, brown, variable in shape, angular, with one side flattened or slightly depressed as seen in side view, minutely echinulate, monoguttulate in recent collections.

Habitat: Malaya, Pahang, Bebar, coll. *E. J. H. Corner*, 14.6.1932 (No. 751) [TYPUS]; Malaya, Johore, Sungei Pendas, coll. *E. J. H. Corner*, April 1941 (No. 750); Malaya, Forest Research Institute, Kepong, coll. *B. A. Mitchell*, 5.12.1956, associated with the roots of the following: *Eucalyptus grandis* (No. 1815), *Casuarina equisetifolia* (No. 1816), *Eucalyptus deglupta* (No. 1817), *Acacia auriculaeformis* (Nos. 1818 and 1819), *Eucalyptus alba* (No. 1820); Malaya, Forest Research Institute, Kepong, coll. *B. A. Mitchell*, 28.11.1956 (No. 1814), on the ground apparently growing on the roots of *Eucalyptus deglupta*; Malaya, Kuala Lumpur, coll. *A. Johnston*, 13.7.1956 (No. 1685), growing in soil apparently associated with roots of *Eucalyptus camaldulensis*.

The collection No. 1485 cited above is anomalous in possessing thin or slightly thick walled, subcylindric sterile elements in the hymenium which project up to 30μ above the basidia. These organs may reach 88μ in length and 9·5μ in width.

The author thanks Dr. E. J. H. Corner for permission to describe this species, which was represented in the Kew Herbarium by his material under the manuscript name *T. casuarinae*.

Plant Growth in a Phytotron.*—'The great development of statistics and its extreme use in the botanical sciences may to some extent have blinded us to the simple truth that there is no substitute for a properly executed experiment, and that a proper experiment is one in which all variables are known and controlled.' 'This closer contact with the individual plant cannot fail to be beneficial to the development of botany, which is the science of plants and not of averages.' These two statements taken from Professor Frits W. Went's book, summarizing the first six years working of the Earhart Plant Research Laboratory at the California Institute of Technology, blow like a refreshing breeze in the somewhat sultry atmosphere in which so much work on plant growth tends to be conducted. All of us who have at any time tried to conduct experiments that entail the cultivation of plants in a controlled environment know how difficult it is in practice to attain any degree of perfection. Unfortunately, however, there are very few botanists in the world who are privileged to conduct experiments in a series of large, highly perfected growth chambers that cost $407,000 to construct. This works out

* The Experimental Control of Plant Growth, with special reference to the Earhart Plant Research Laboratory at the California Institute of Technology. By Frits W. Went with contributions by W. C. Ashby, L. T. Evans, A. W. Galston, H. Hellmers and Wm. M. Hiesey. Waltham, Mass., U.S.A., Chronica Botanica Co. 1957. PP. x + 343 with 25 pls. and 71 text figs. Price $8.50.

at $27 per sq. ft. of experimental floor space. We are, however, assured that this cost is not so remarkably high when it is realized that ordinary glass-house construction costs $10–$16 per sq. ft. in California. This claim that the expense involved is not unduly high, appears to be justified in view of the very accurate, independent control of the individual influences in the environment that has been achieved at the Earhart Laboratory.

It is impossible in this review to summarize all of the exciting results that have already been obtained in this Californian 'phytotron', a term that was first coined with reference to the Earhart Laboratory. Professor Went's book consists of 26 chapters, a bibliography, and separate indexes to authors and subjects. The first part (five chapters) of the book is concerned with the construction and operation of the laboratory; in the second part (nine chapters) the responses of a great variety of different kinds of plants to specific environmental conditions are described; the third part of the book (12 chapters) is concerned with a general discussion of the results so far obtained.

Some of the facts that have been discovered provide plenty of food for thought. Thus we are told that relative humidity has little effect on the growth of plants provided that they are adequately supplied with water. The apparently beneficial effect of high atmospheric humidity in glasshouses is actually due to a temperature effect. Then again the application of water in the form of rain, as distinct from applying the same total amount of water in some other form, has a more stimulating effect on the germination of seeds and on the subsequent development of the plants. Can it indeed be true that the practical gardener is not so far wrong when he says that watering is no substitute for 'a nice steady rain' in promoting growth.

Students of the influence of air pollution on the growth of plants will be interested to know that daily fluctuations in the *Avena* test for auxin, which have hitherto been accepted as normal in California, are in fact due to smog. Furthermore the toxic ingredients of the smog are 'peroxides and ozonides of hydrocarbons', which induce injuries to leaves by causing loss of semi-permeability of mesophyll cells in the neighbourhood of stomata. The polluted air of California can be made completely non-toxic by passing it through activated carbon.

Each species and variety of plant, we are told, as indeed we might have guessed from everyday experience, has its own optimal requirements which differ qualitatively and quantitatively from all others. For this reason it is very difficult to make generalizations concerning plant growth that are of universal application. Ecologists and taxonomists should note, however, that closely related plants are usually most strongly affected by the same climatic variables, whereas plants in different families often show the most marked response to quite different climatic factors. Differences in the responses of varieties of the same species, or between different species of the same genus or genera of the same family are usually quantitative rather than qualitative in nature. To the reviewer, a student of the comparative anatomy of plants, this tendency towards diversity of physiological response in different taxonomic groups seems eminently reasonable. For the anatomy of the vegetative organs of families between which there are no close affinities is never the same, and since there is probably closer relationship between structure and physiological behaviour than is sometimes realized, it follows

that the anatomical differences are concrete visible reminders that a corresponding physiological divergence is only to be expected.

In this phytotronic age one might well ask oneself whether, in the future, experiments that are not conducted in one of these emporiums of experimental exactitude will serve any useful purpose. This is a hard question to answer, but to the reviewer it seems probable that valuable as phytotrons undoubtedly are and will become, future advances in our knowledge of plant growth will not necessarily be confined to them.

Whilst the memory of the work of that pioneer amongst British plant physiologists—Stephen Hales—still remains, it seems hard to believe that physiological salvation will come only through the phytotron. For Stephen Hales made his great contribution to botanical knowledge by using only the simplest equipment for his classical experiments in the garden of the country parsonage at Teddington where he lived. Whilst the circumstances and problems of today differ from those in the time of Hales, there is still so much about the responses of plants to their environment that we do not understand that an experimentally minded botanist, whether he be working in his back garden or making his way through a tropical rain forest, should not feel that he has no prospects of adding his crumb of physiological knowledge to the general pool.

Whilst our knowledge of factors controlling the growth of plants remains so imprecise, successful cultivation will remain an art as well as a science. Our existing greenhouses are excellent examples of what can be achieved by intelligent compromise. It is suggested in Professor Went's book that it is a wrong principle to have glasshouses devoted to the cultivation of, for example, 'ferns' or 'orchids'. This is undoubtedly true if the optimum growth of all the of species is to be obtained. But who, after walking round the 'fernеries' at Kew can fail to be impressed by the success with which the 'ferns' in them are cultivated, or by the fine display that they provide. The fact is that although there are optimum conditions for the growth of each species, many of them exhibit a wide range of tolerance. They will grow quite well in suboptimum conditions provided they do not have to meet the full force of competition from other species that would flourish more successfully in the same environment. It is interesting to read that, in the Earhart Laboratory, *Nepenthes* could not be induced to produce typical pitchers in any of the environmental conditions that were provided for them. This seems all the more surprising in view of the fact that *Nepenthes* with pitchers have been very successfully grown at Kew for many years in spite of our having no phytotron. The Earhart workers will no doubt discover the reason for their failure in due course and then be able to give us more detailed information about the optimum conditions for the successful cultivation of *Nepenthes* than we at present possess at Kew. From this it would appear that the moral to be drawn is that the best chances of progress in plant cultivation are likely to accrue by combining the knowledge obtained by many generations of practical horticulturalists with the very detailed and most valuable knowledge that is being secured by carefully controlled experiments such as those at the Earhart Laboratory. Everyone interested in plant growth should read Professor Went's book, for he must indeed be a dull fellow who fails to be interested or stimulated by it.

C. R. METCALFE.

New and Noteworthy Cassias from Tropical Africa

J. P. M. Brenan

All cited specimens are, unless otherwise indicated, in the Herbarium of the Royal Botanic Gardens, Kew.

In the description of new species etc., matter not derived from study of the holotypes is enclosed in square brackets.

Cassia abbreviata and its relatives

Cassia abbreviata was described by Oliver in 1871 in Fl. Trop. Afr. **2,** 271, and was at that time clearly distinct from the other species in the genus. Since then *C. abbreviata* has been proved to have a wide range in eastern and southern Africa.

Also however since 1871 there have appeared from time to time the description of various other species very closely related to *C. abbreviata*, of which the most important are *C. beareana* Holmes (1902), *C. granitica* Bak. f. (1905) and *C. kassneri* Bak. f. (1929); De Wildeman was responsible for others.

In this way the originally clear conception of *C. abbreviata* became less so. *C. granitica* was sunk as a variety under *C. abbreviata*, while *C. beareana* was maintained as only doubtfully distinct. More recently, in 1951, Steyaert separated a var. *glabrifructifera* from *C. abbreviata*, sinking under it two of De Wildeman's species.

While dealing with *C. abbreviata* for the Flora of Tropical East Africa, I found it necessary to account for *C. beareana* and *C. kassneri*, and in order to gain a clearer idea of their status, the variation of *C. abbreviata* was examined throughout its range. The rich material of *C. abbreviata* and its relatives in the Kew Herbarium was amalgamated and then sorted without reference to the names appearing on the specimens. As a result three entities could be recognised, separated from one another primarily by differences in indumentum and flower-size. I consider these most satisfactorily placed as subspecies of *C. abbreviata* for the following reasons:—

1. Two of the three entities are separated from one another solely by indumentum differences which, although they affect different parts of the plant, may well be accounted for by a single genetic factor.

2. The third entity has indumentum similar to certain forms of one of the other two, but is distinguished by flower-size, a single difference of degree rather than kind.

3. In spite of the differences, the three entities are very similar indeed in general appearance and in most morphological features.

Cassia abbreviata *Oliv.* in Fl. Trop. Afr. **2,** 271 (1871).

subsp. **abbreviata**

Ramuli pubescentes. Foliola subtus pilis non appressis saepe curvatis pubescentia. Axis inflorescentiae pilis patentibus dense et breviter pubescens.

Petala 2–3 cm. longa, 0·8–1·5 cm. lata. Legumina fere semper dense tomentella vel velutina.

It does not seem necessary to give a full citation of specimens of this and the two following subspecies, but rather to indicate the geographical ranges, with selected specimens from each territory.

Subsp. *abbreviata* occurs in the Belgian Congo (Elisabethville, *Quarré* 3845), Tanganyika Territory (Shinyanga, *Koritschoner* 1679, Ugalla R., S.W. of Tabora, *Bally* 7517, Mpwapwa, *Hornby* 310, Bulambia, *Stolz* 1625, Mnacho, *Gillman* 1239), Portuguese East Africa (Mutuali, *Gomes e Sousa* 4037, between Vila Paiva and Vila Pery, *Torre* 6000, between Mandié and Mungari, *Torre* 5813), Nyasaland (*Greenway* 6380) Southern Rhodesia (Charter, *Eyles* 4034, Ulali, *Myres* 274), Northern Rhodesia (Mufulira, *Cruse* 395, Mkupa, *Bullock* 1188). The syntypes of *Cassia abbreviata*, all at Kew, are from Portuguese East Africa, near Lupata, *Kirk s.n.* and near Tette, *Kirk s.n.*, and from Nyasaland, Manganja Hills, *Meller s.n.*, and L. Nyasa, Cape Maclear, *Kirk s.n.*

As far as Tanganyika is concerned, subsp. *abbreviata* is apparently restricted to altitudes above 900 m., although this does not seem to apply elsewhere.

The non-appressed often curled hairs forming the pubescence on the lower surface of the leaflets distinguish subsp. *abbreviata* from the other two subspecies.

The pods of subsp. *abbreviata* are normally densely velvety or tomentellous. Those of *Greenway* 6380 (Nyasaland, Chitala to Domera Bay) are glabrous except for a minute inconspicuous puberulence. In other ways this specimen is typical subsp. *abbreviata* (the ovary is densely pubescent). For the time being I consider it best treated as an unnamed variant of subsp. *abbreviata*.

subsp. **beareana** (*Holmes*) *Brenan*, subsp. et comb. nov.

Cassia beareana Holmes in Pharm. Journ. **68** (ser. 4, **14**), 42 (1902); Bak. f., Leg. Trop. Afr. 631 (1930); Brenan & Greenway, Check-Lists For. Trees & Shrubs Brit. Emp. **5** (**2**) (Tang. Terr.), 98 (1949).

Cassia droogmansiana De Wild. in Ann. Mus. Congo, ser. 4, **1,** 47 t. 17 (1902).

C. granitica Bak. f. in Journ. Bot. **43,** 45 (1905).

C. bequaertii De Wild. in Fedde, Repert. **11,** 513 (1913).

C. abbreviata Oliv. var. *granitica* (Bak. f) Bak. f., Leg. Trop. Afr. 632 (1930).

C. abbreviata Oliv. var. *glabrifructifera* Steyaert in Bull. Jard., Bot. Brux. **21,** 357 (1951); and in Fl. Congo Belge **3,** 502 (1952).

Ramuli pubescentes vel puberuli. Foliola subtus fere semper pilis minutis inconspicuis appressis rectis saepe 0·1 mm. longis puberula. Axis inflorescentiae fere semper pilis brevissimis patentibus pubescens, raro pilis appressis puberulus. Petala 1·8–3 cm. longa, 0·9–1·5 cm. lata. Legumina dense puberula vel raro glabra.

Subsp. *beareana* occurs in the Belgian Congo (Kiniama, *Schmitz* 3373, Tshikanda, *Schmitz* 3415), Somalia (*Suckert* 63), Kenya (Kibarani, *Jeffrey*

K 96, Kiunga, *Mrs. Adamson* 280 *in Herb. Bally* 5971), Tanganyika (Zindeni Hills, *B. D. Burtt* 4830, Morogoro District, *Wallace* 443, Uluguru Mts., *E. M. Bruce* 95), Portuguese East Africa (Madanda Forest, *Dawe* 454, Mgulumi Mission, *Mrs. Faulkner, Kew No.* 55, between Funhalouro and Saúte, *Torre* 2693, near Magude, *Mendonça* 3143), Southern Rhodesia (Nyamandhlovu, *Plowes* 1641, Gatooma, *Eyles* 7050), Bechuanaland Protectorate (Nkange, *Cardross Grant* 11, Chobe, *Robertson & Elffers* 90), Northern Rhodesia (Mazabuka District, *Milne-Redhead* 1229, Victoria Falls, *Milne-Redhead* 414), the Transvaal, (near Skukuza, *Codd* 4389, 6127, near Wylie's Poort, *Dyer* 3876) and South West Africa (Grootfontein, *Schoenfelder* S. 126).

The type of *C. beareana*, collected probably in Tanganyika by *Dr. O'Sullivan Beare*, is in the herbarium of the Pharmaceutical Society of Great Britain in London, and there are fragments at Kew. Thanks to the courtesy of the Curator of the Museums Department of the Pharmaceutical Society, I have been enabled to study this specimen. Prof. Dr. W. Robyns, Director of the Jardin Botanique de l'État at Brussels, has kindly sent on loan *Bequaert* 202 and *Verdick* 26, the holotypes of *C. bequaertii* De Wild. and *C. droogmansiana* De Wild. respectively. The holotype of *C. granitica* Bak. f. (*Eyles* 1080, Southern Rhodesia, near Bulawayo) is in the herbarium of the British Museum (Natural History), where I have examined it.

In Tanganyika and Kenya subsp. *beareana* has not been recorded at altitudes higher than 760 m., above which in Tanganyika it is replaced by subsp. *abbreviata*. In the Rhodesias at least, subsp. *beareana* occurs above 760 m.

Subsp. *beareana* is separated from subsp. *abbreviata* by the minute appressed indumentum (rarely absent) on the lower surface of the leaflets, and from subsp. *kassneri*, which has a similar indumentum on the leaflets, by the larger petals and (almost always) by the short but spreading hairs on the axis of the inflorescence.

There would seem to be a wider range of variation in subsp. *beareana* than in the other two subspecies. This affects principally the leaflets, inflorescences and pods, and will be considered under the three headings:—

(1) *Variation in the leaflets of subsp. beareana.* In Portuguese East Africa and the Rhodesias specimens occur with marked glaucescence on the lower side of the leaflets when dry. There is a frequent tendency for the leaflets to be small, but numerous intermediates, both in size and glaucescence, connect these forms with normal subsp. *beareana*. In specimens from the Transvaal the leaflets are often narrower than usual, but this is likewise only a tendency.

A more important variation is seen in certain specimens from Northern Rhodesia, near the Victoria Falls, (*Allen* 35, *F. A. Rogers* 7451, *Milne-Redhead* 414), and from Grootfontein in South West Africa (*Schoenfelder* S. 126). The leaflets of these specimens are glabrous or nearly so beneath, except for a few minute appressed hairs on the lower side of the midrib when the leaflets are young.

(2) *Variation in the inflorescences.* The hairs on the inflorescence-axes of specimens from the Transvaal are very commonly shorter and more appressed than in typical subsp. *beareana*. Sometimes the hairs are so short and close as to be scarcely distinguishable from those of subsp. *kassneri*, and the specimens are then only separable from subsp. *kassneri* by the larger petals. Examples

are: near Wylie's Poort, *Dyer* 3876, Skukuza Rest Camp, *Codd* 6127, and Silwane Location, *Breyer* 17562.

(3) *Variation in the pods*. The pods of certain Belgian Congo specimens are glabrous or very nearly so, and caused Steyaert to make a separate var. *glabrifructifera*. The leaflets of the glabrous-podded specimens which I have examined are in indumentum etc. typical of subsp. *beareana*. Indeed the pods of the holotype of *C. beareana* are glabrous, and it is the puberulous podded plants that might, if thought fit, be varietally separated.

I have not been able to examine the types of *C. atroreticulata* Chiov., Fl. Somala **2,** 173 (1932) (Somalia, Brava, *Senni* 114, Kisimayu, *Senni* 117, 168). From the description it is evidently either subsp. *beareana* or subsp. *kassneri*, although the size of the petals given by Chiovenda (19–22 × 12–13 mm.) would fit the former better.

subsp. **kassneri** (*Bak. f.*) *Brenan*, subsp. et comb. nov.

Cassia kassneri Bak. f. in Journ. Bot. **67,** 194 (1929); and in Leg. Trop. Afr. 632 (1930).

Ramuli pilis minutis appressis puberuli. Foliola subtus pilis minutis inconspicuis appressis rectis saepe 1 mm. longis puberula. Axis inflorescentiae ut ramuli indutus. Petala 1·5–1·9 cm. longa, 0·7–1 cm. lata. Legumina dense et minute griseo-puberula.

Subsp. *kassneri* is found in Kenya (e.g. 25 km. N.E. of Wajir, *Gillett* 13362, Mutha Plains, *Joana in Herb. Bally* 7429, between Samburu and Mackinnon Road, *Drummond & Hemsley* 4059) and in northern Tanganyika (Lushoto District, Mnazi, *Greenway* 1971). It occurs at altitudes between about 350 and 1000 m.

The holotype of *C. kassneri* (Kenya, Machakos District, Makindu R., *Kassner* 598) is in the herbarium of the British Museum (Natural History) and there is an isotype at Kew.

The minute appressed indumentum on the lower side of the leaflets together with the comparatively small petals will easily separate subsp. *kassneri* from subsp. *abbreviata*. The minute appressed hairs on the inflorescence-axes together with the smaller petals will normally distinguish subsp. *kassneri* from subsp. *beareana*. The Transvaal specimens of subsp. *beareana* mentioned above, with more appressed indumentum than usual on the inflorescence-axes, may be separated from subsp. *kassneri* only by flower-size.

Cassia thyrsoidea *Brenan*, sp. nov.

[*C. sieberiana* sensu Brenan & Greenway, Check-Lists For. Trees and Shrubs Brit. Emp. **5** (**2**) (Tang. Terr.), 97 (1949), *pro majore parte, quoad specim. cit.*, non DC.].

C. afrofistulae Brenan, cui inflorescentiae forma et habitu similis, certe affinis, indumento ramulorum foliorum inflorescentiarum multo densiore, bracteis longioribus persistentibus differt; praeterea haudquaquam regionis orae maritimae incola.

Arbor [4·8] 10 [–18] m. alta [vel fide *Burtt* 4534 frutex semi-scandens usque ad 4·5 m. alta]. *Ramuli* juveniles dense olivaceo-brunneo-pubescentes, indumento pilis patentibus composito satis persistenti; ramuli vetustiores brunnei vel nigrescentes, siccitate leviter costati. *Folia*: stipulae caducissimae; petiolus

4·5–8·2 [–9·2] cm. longus, subteres, dense pubescens, eglandulosus; rhachis 14·2–22 [–26] cm. longus, dense pubescens, eglandulosus, ultra par terminale foliolorum in appendiculam filiformem aphyllam pubescentem 1·2–2·8 cm. longam saepius desinens; foliola 6–7 [–8]-juga, petiolulis 3–5 mm. longis dense pubescentibus suffulta, rigide papyracea, elliptica vel inferiora paullum ovato-elliptica, 4·5–11·5 cm. longa, 2·4–5·1 [–6] cm. lata, apice subacuta vel obtusa [vel nonnunquam rotundata vel emarginata], basi fere symmetrica cuneato-attenuata vel cuneata [vel rotundata], subtus tomentosa [vel praesertim in costa et nervis lateralibus pubescentia, supra plus minusve appresse-pubescentia [usque subglabra], nervis lateralibus primariis circiter 7–13 utroque costae latere sed a secundariis aegre cernendis cum rete venularum utrinque satis prominentibus. *Inflorescentiae* ovoideae, erecto-adscendentes, paniculatae, terminales, more ramulorum juvenilium vestitae, e racemis terminalibus 17 cm. vel ultra longis et lateralibus circiter 15–27 cm. longis his saepe iterum ramosis compositae, 20–30 vel sine dubio ultra longae, 18–45 cm. latae; bracteae lineari-lanceolatae, 8–11 mm. longae, 1–1·5 mm. latae, acutae, anthesi persistentes; bracteolae 5–6 mm. longae; pedicelli anthesi 2–3 cm. longi. *Sepala* intus puberula, extra dense et breviter olivaceo-pubescentia, indumento paullum argenteo-fulgente, obovato-elliptica, 9–12 mm. longa, 5–8 mm. lata, apice rotundata. *Petala* obovata, 15–25 mm. longa, 10–16 mm. lata, apice rotundata, basi in unguem 2–4 mm. longum gradatim attenuata, lutea. *Stamina* 10; tria antica filamentis 2–3 cm. longis valde arcuatis, basi S-formiter curvatis, paulum supra medium leviter incrassatis, antheris 4·5 mm. longis superne birimosis; stamina alia 7 quorum 4 filamentis circiter 0·9–1 cm. longis, antheris 5–6 mm. longis biporosis, 3 filamentis circiter 6–8 mm. longis, antheris 2–2·5 mm. longis. *Ovarium* lineare, arcuatum, dense pubescens, circiter 3–4 cm. longum. [*Legumina* recta vel subrecta, subcylindrica, hic illic irregulariter constricta, circiter 32–42 cm. longa, 1–1·5 cm. diametro, apice attenuata, basi breviter angustata, atropurpurea, sparse pubescentia usque subglabra, exocarpio duro nisi aetate vix facile fractu, intus parietibus stramineis transverse septata. *Semina* ut videtur in pulpa viscosa sita, castaneo-brunnea, nitida, ovato-orbicularia, circiter 7 mm. longa, 6 mm. lata, 3 mm. crassa.].

Tanganyika. Mpwapwa District: Mpwapwa, fl. 12 Jan. 1930, *H. E. Hornby* 156 (EA, K): —tree 4·8–6 m. tall near small stream. On path to Kiboriani, 1370 m., fl. 25 Jan. 1933, *B. D. Burtt* 4534 (BM, EA, K):—semi-scandent shrub to 4·5 m. in thicketed ravine in *Julbernardia-Brachystegia* woodland; also very common in riverine forest of the Matamondo R., where it attains 9 m. Mpwapwa, 900 m., fl. Jan.–Feb. 1937, *Lindeman* 234 (BM, EA):— on banks of river at foot of Kiboriani; tall tree up to 15–18 m., common. Songea District: 32 km. E. of Songea, by R. Mkukira in fringing forest, 930 m., fl. 19 Jan. 1956, *Milne-Redhead & Taylor* 8272 (K, holotypus):—tree about 10 m. high; leaf-rhachis buff; lamina dark green above, paler beneath, with prominent pallid nerves; inflorescence ascending; buds dark green; calyx spreading or reflexed; petals yellow; ovary whitish; filaments pale yellow; anthers reddish-brown. Same locality, frt. Sept. 1957, coll. *J. E. Sullivan*, comm. *G. T. L. Scott s.n.*

C. thyrsoidea clearly finds its closest affinity with *C. afrofistula*. The ample paniculate inflorescence, built up of terminal and lateral racemes, and borne in an ascending or erect position, is common to both species, and is in marked contrast to the pendulous inflorescences of the other related species in Africa, *C. sieberiana* and *C. burttii*. *C. thyrsoidea* is separated from *C. afrofistula* by the much denser indumentum and by the bracts being persistent while the flowers are open and also longer. *C. afrofistula* is a coastal species, while *C. thyrsoidea* is not.

Cassia afrofistula *Brenan*, sp. nov.

[*C. sieberiana* sensu [Dale], Trees & Shrubs of Kenya Colony, ed. 2, 61 (1936), non DC.].

[*C. fistula* sensu Brenan & Greenway, Check-Lists For. Trees & Shrubs Brit. Emp. **5** (**2**) (Tang. Terr.), 97 (1949), *pro parte, et verisim. auct. al.*, non L.].

[*C. beareana* sensu R. O. Williams, Useful & Ornamental Plants Zanzibar & Pemba 175 (1949), non Holmes].

C. fistulae L. affinis, inflorescentiis saepissime erectis (raro ut videtur pendulis) pyramidali-paniculatis, foliolis basi magis obliquis subtus glabris vel raro (in var. *patentipila*) pilis crispulis subtus saepius sparse pubescentibus, nervis lateralibus paucioribus, filamentis staminum trium anteriorum paulum supra medium nodoso-incrassatis, leguminibus angustioribus basi apiceque attenuatis, exocarpio multo tenuiore facile fractu haud lignoso, seminibus minoribus saepe atrobrunneis suborbicularibus plane differt.

[*Frutex* vel] *arbor* parva, [1·2–6 m. alta (?ultra)]. *Ramuli* juveniles minute puberuli [vel pubescentes], mox glabri et tum siccitate atropurpurei, leviter costati. *Folia*: stipulae caducissimae; petiolus [3·3–] 4–8 cm. longus, subteres, glaber, eglandulosus; rhachis [7–] 14–16 [–25] cm. longus, supra levissime puberulus, eglandulosus; foliola 4– [5–7] 8–9-juga, petiolulis 2–5·5 mm. longis plus minusve crispule puberulis suffulta, papyracea, ovata vel ovato-elliptica, 3–7·5 [–10] cm. longa, 2–3·3 [–5·2] cm. lata, infima minora, circiter 2–2·5 cm. longa et 1–1·5 cm. lata, apice obtusa [vel subacuta], basi asymmetrica et plus minusve late cuneata vel subrotundata, utrinque imo basi levissime puberulo excepto glabra vel raro (var. *patentipila*) subtus plus minusve crispule pubescentia, nervis lateralibus primariis utroque costae latere circiter 8–15 sed saepe a secundariis aegre cernendis cum rete venularum utrinque satis prominentibus. *Inflorescentiae* pyramidales, erectae (raro ut videtur pendulae), paniculatae, terminales, puberulae [raro pubescentes], usque ad minimum 30 [–40] cm. longae et 19 cm. latae, e racemis terminalibus et lateralibus compositae, racemis terminalibus 15 [–38] cm. longis, lateralibus 8–13 [–26] cm. longis; bracteae lanceolatae, 4–5·5 [–6 (–8)] mm. longae, 1 mm. latae, acutae, ante anthesin omnino caducae; bracteolae 1·5–2 [–2·5] mm. longae; pedicelli anthesi 2–3 [–4] cm. longi. *Sepala* utrinque puberula, [raro breviter pubescentia], obovato-elliptica, [7–10–] 12 mm. longa, 5 [–8] mm. lata, apice rotundata. *Petala* obovata, [15–] 18–23 [–25] mm. longa, 10–14 [–15] mm. lata, apice rotundata, basi in unguem circiter 3 mm. longum gradatim attenuata, lutea. *Stamina* 10; tria antica filamentis circiter 2·8 cm. longis valde arcuatis, basi S-formiter curvatis, paulum supra medium conspicue nodoso-incrassatis, antheris 3·5–5 mm. longis superne birimosis; stamina alia 7 quorum 4 filamentis circiter 0·9–1 cm. longis, antheris circiter 4–5 mm. longis biporosis, 3 (quorum 2 arcuatae) filamentis circiter 5–6 mm. longis, antheris 2 [–3] mm. longis. *Ovarium* lineare, arcuatum, appresse puberulum, [raro breviter pubescens], circiter 2 cm. longum. [*Legumina* recta vel levissime curvata, cylindrica vel levissime compressa, 20–60 cm. longa, 1–1·5 mm. diametro, basi apiceque attenuata, atrobrunnea, glabra, exocarpio haud lignoso satis tenui digitis facile factu, intus parietibus stramineis transverse septata. *Semina* in pulpa viscosa sita, atrobrunnea vel brunnea, nitida, suborbicularia, 6–8 mm. diametro, 4 mm. crassa.].

var. **afrofistula**

Foliola imo basi levissime puberulo excepto glabra. Inflorescentiae pilis plerumque curvatis appresse puberulae.

KENYA. Northern Frontier Province: Kitangari, 90 m., fl. 27 Dec. 1946, *Mrs. Adamson* 303 *in Herb. Bally* 5994:—small tree. Kwale District: Mrima Hill, fl. 4 Sept. 1957, *Verdcourt* 1866:—small bush 2·4 m. high; flowers yellow; anthers brown; ovary green; in grassland at edge of forest. Kilifi District: 'Ribe to Galla country', *Rev. T. Wakefield s.n.* Mida, *R. M. Graham in F.H.* 1966 *in C.M.* 189 (EA, K):—small tree to 4·5 m.; flowers bright yellow; in bush on edge of forest: vernacular name (Kisanya) 'wasamara'. Malindi, *R. M. Graham in F.H.* 2054 (EA, K):—small tree—5 m.; flowers bright yellow; pods 45 cm.: vernacular name (Swa.) 'mbaraka'. Boula, coast N. of Malindi, 90 m., frt. 5 Nov. 1945, *Mrs. Adamson* 192 *in Herb. Bally* 6092 *in C.M.* 17999 (EA, K):—small tree; concoction of bark cures pains in liver and kidney: vernacular names (Boni) 'chamarda', 'kiange'. Malindi, sea-level, fl. Oct. 1951, *Mrs. Tweedie* 996:—shrub to 3 m.; flowers yellow; inflorescence at end of long new shoot and has 20–30 branches. Tana River District: Mambosasa, 1929, *R. M. Graham* Z. 303 *in F.H.* 1791 *in C.M.* 13931 (EA, K):—small tree to 6 m., on edge of forest; flowers bright yellow: vernacular names (Swa., Lamu) 'mbaraka-mtoto', (Swa.) 'mbaraka', (Kiboni) 'kihanyini'. District uncertain: 'N. of Mombasa, to Lamu and Witu', 1902, *A. Whyte* 297 (K), *s.n.* (BM). Without locality *C. F. Elliott s.n.*

TANGANYIKA. Tanga District: Tanga, *Heinsen* 83. Moa, fl. Feb. 1893, *Holst* 3005 (P). Tanga, Ras Kazone, fl. May 1942, *Lindeman* 1025 (EA, K):—small tree with yellow flowers; on cliff's edge, common along coast. Tanga, Manhako, fl. Oct. 1942, *Lindeman* 1031 (EA, K):—small tree with yellow flowers in coastal vegetation on cliff-edge. Sawa, a little above sea-level, fl. 13 Feb. 1957, *Mrs. Faulkner* 1956 (K, holotypus speciei):—in coastal bush or savannah; a small tree with large golden-yellow flowers, scented; often blooms before the leaves appear; common. Same locality, frt. 14 Sept. 1957, *Mrs. Faulkner* 1956. Sawa–Kivindani area, frt. 14–15 Sept. 1957, *Mrs. Faulkner* 2062:—coastal bush in savannah; a very handsome small tree; fruits much attacked by some kind of borer which seems to eat the rather sweet fibrous pulp which surrounds the seeds. Pangani District: Pangani, 30 m., fl. 25 Oct. 1955, *Tanner* 2466:—on hillside, on edge of forest; tree 3 m. high, coppice-growing; rough bark; sap colourless; flowers yellow. Bojo, Mwera near Pangani, 45 m., fl. and young frt. 19 Nov. 1956, *Tanner* 3349:—in thicket on heavy black fissuring clay; tree 2·4 m. high, growing singly; bark corrugated; flowers yellow: used by the Zigua for gonorrhoea: roots boiled and the water drunk: vernacular name (Zigua) 'mkwizingi'. Bagamoyo District: 19 km. inland from Bagamoyo, fl. Feb. 1871, *Kirk s.n.*:—small tree. Uzaramo District: Dar es Salaam, fl. Feb. 1874, *Hildebrandt* 1216 (K, P):—shrub or tree 3 m. high; flowers golden yellow. Sachsenwald, fl. 26 Jan. 1902, *Holtz* 434 (EA). Mafia Island, 28 Mar. 1933, *G. B. Wallace* 789:—tree 2·1 m. Mafia Island, fl. 3 Apr. 1933, *G. B. Wallace* 743. Mafia Island, Djimbo, 11 Aug. 1936, *Fitzgerald* 5231/1 (EA, K):—two noticeable trees in 'bush-islands' in savannah on heavy black soil. Lindi District: Ngongo, fl. 25 May 1943, *Gillman* 1483 (EA, K):—tree with bright yellow flowers and a long round pod. District uncertain (probably Tanga or Pangani): Mizofue, fl. Feb. 1893, *Holst* 2224. Without precise locality, *Busse* 455 (EA). Locality illegible, *Warnecke* 6934 (EA). ?Tanganyika: 'Zanzibar Coast', *Hildebrandt s.n.* (BM).

ZANZIBAR. Zanzibar Island, fl. Jan. 1888, *Sacleux* 506 (P):—shrub 1 m., flowers yellow, terminal; pod 40 cm. long. Zanzibar Island, 1888, *Sacleux* 117 (P):—shrub found in the centre of the island in a marshy plain covered with ferns; it produces 1–3 straight stems, each somewhat arching at top and ending in a large panicle of flowers. Zanzibar Island, fl. Feb. 1893 *Sacleux* 117 (P). Zanzibar Island: 1901, *Lyne* 10, 1908, *Last s.n.*, 1927, *Toms* 123. Mkunduchi, fl. 9 Nov. 1926, *J. H. Vaughan* 64 (BM, EA):—Shrub 2·4 m. high, very common in the bush; flowers large, brilliant yellow, with very faint sweet smell; pods long, black, 30–45 cm. long. Fumba, fl. 28 Jan. 1929, *Greenway* 1233 (EA, K):—growing in sand above high-water mark near the sea-shore; a shrub with very large panicles of yellow flowers and pods a foot or more long. Fumba Bush, 12 Jan. 1930, *J. H. Vaughan* 1084:—low tree. Chukwani Bush, buds 21 Jan. 1930, *J. H. Vaughan* 1120 (EA, K):—low tree. 18th mile, Chwaka Road, sea-level, fl. 9 Dec. 1954, *R. O. Williams* 189:—shrub, very attractive; flowers bright yellow, in a terminal head; by roadside. *Mrs. Taylor* 130 (EA):—large yellow flowers; hanging down over the sea from coral rock.

PORTUGUESE EAST AFRICA. Zambézia: Praia de Pebane, 24 Oct. 1942, *Torre* 4670:—shrub 2–4 m. high; in the dense bush of the dunes. Beira: Beira, frt. Oct. 1894, *Kuntze s.n.* Dondo near Beira, fl. Dec. 1899, *Hon. Mrs. E. Cecil* 253:—in the swamps; 1·2 m. high; flowers yellow. Beira beach, sea-level, fl. 29 Dec. 1906, *Swynnerton* 1431 (BM, K):—a common small tree with showy yellow flowers. Mzimbili near Beira, fl. Dec. 1910, *Dawe* 350:—small shrub; flowers yellow. Beira, fl. 25 Feb. 1912, *F. A. Rogers* 4558 (BM, K). Sul do Save: near route Zovala–Inharrime, very near Inharrime R., fl. Jan. 1939, *Gomes e Sousa* 2188, and near same route near km. 15 from Inharrime, fl. Jan. 1939, *Gomes e Sousa* 2189. Near the lighthouse Boa Paz, Chedinguel–Zavala, fl. 11 Dec. 1944, *Mendonça* 3386:—shrub or small tree 4–5 m. high; flowers egg-yolk yellow; fruits 40–50 cm. long.

var. **patentipila** *Brenan*, var. nov.

Foliola saepius subtus praesertim in costa et basim versus sparse vel sparsissime crispule pubescens, [raro glabra vel densius pubescentia]. Inflorescentiae pilis patentibus breviter vel brevissime pubescentes.

Portuguese East Africa. Niassa: R. Msalu, fl. Nov. 1911, *C. E. F. Allen* 77:—small tree; sandy flats: vernacular name 'denberembe' [*Allen* 77 is a form with unusually strong pubescence]. Zambezia: Cundine, fl. 16 Nov. 1904, *Le Testu* 544 (P):—in sandy forest. Near Mocuba, fl. 12 Dec. 1943, *Torre* 4798:—shrub 2–3 m. high; flowers yellow; in secondary bush. Mocuba, Namagoa, 60–120 m., fl. Nov.–Jan. 1945, *Mrs. Faulkner, Pretoria No.* 343:—very attractive bushes, common in light forest and plantation; flowers bright pale yellow. Same locality, fl. Dec. 1946, *Mrs. Faulkner, Pretoria No.* 343, drawing no. 483 (K, holotypus varietatis):—a handsome shrub common in bush in open forest. Same locality, frt. Apr., *Mrs. Faulkner, Pretoria No.* 343.

Cassia afrofistula has, as the synonymy given above shows, been misidentified with *C. sieberiana* DC., *C. beareana* Holmes and *C. fistula* L. *C. sieberiana* is very distinct in its indumentum, pendulous racemes and more persistent bracts; *C. beareana*, even more distinct, is, as shown elsewhere in this paper, conspecific with *C. abbreviata* Oliv. The relationship with *C. fistula* is closer, however, and under that name specimens of *C. afrofistula* are most likely to be found in herbaria. Baker fil., Leg. Trop. Afr. 633 (1930) issued a warning against such misidentification when he wrote of *C. fistula*: 'Many mistakes have been made with regard to this species. *Goetze* 349 [*C. burttii* Bak. f.] and *Hildebrandt* 1216 [*C. afrofistula*] have been incorrectly referred here.' Certain specimens at Paris, collected by Sacleux, have been correctly distinguished by Ghesquiére under a name which has, however, never been published. I must here thank Professor H. Humbert and M. J. Léandri, through whose courtesy and help I was able to examine them.

The native country of true *C. fistula* L. is uncertain, but probably tropical Asia (see De Wit in Webbia **11,** 211–212: 1955). It has, however, been cultivated on account of its attractiveness in many parts of the tropics, including East Africa, and has been called 'Golden Shower'.

C. afrofistula differs from *C. fistula* in a number of ways, but perhaps most strikingly in the inflorescence, which in *C. fistula* is a pendulous simple or very rarely forked raceme, the racemes either single or up to three together. In *C. afrofistula* the inflorescence is almost always erect, although a few specimens (e.g. *Mrs. Tweedie* 996, Kenya, *Holst* 2224, Tanganyika) suggest, by the direction of the ovary and anterior stamens, that it may have been drooping. The inflorescence of *C. afrofistula* is built up of racemes, individually usually shorter than those of *C. fistula*, but aggregated into a usually large, terminal, pyramidal panicle. The individual flowers of *C. afrofistula* are often somewhat smaller than those of *C. fistula*, and the three anterior stamen-filaments are characteristically swollen just above their middle, recalling those of *C. burttii* and *C. abbreviata*. This swelling seems to be lacking in *C. fistula*.

The leaflets of *C. afrofistula* are more asymmetric at their base than those of *C. fistula*; the lateral nerves are fewer; and the lower surface is glabrous or sometimes (in var. *patentipila*) with a usually sparse crisped pubescence, but lacking the characteristic appressed puberulence of *C. fistula*. I am unable to confirm De Wit's description (Webbia, **11,** 208: 1955) of the leaflets of *C. fistula* as 'soon glabrous'. A moderately powerful hand-lens and a leaflet held at the right angle are needed to see the puberulence, however, whose hairs are small, straight and mostly pointing one way.

The pods of *C. afrofistula* show remarkable differences from those of true *C. fistula*. They are much narrower (1–1·5 cm. in diameter as against 1·5–2·5 cm.), ± attenuate not rounded at base and apex, and have a thin brittle wall easily broken when squeezed between the fingers, quite unlike the hard, woody, resistant wall of *C. fistula*. The seeds are also smaller, and usually rounder and darker in colour.

There is a specimen in the East African Herbarium at Nairobi (Tanganyika, Rufiji Delta, Salale Island, 15 Jan. 1939, *Burrows in F.H.* 1499), consisting of a leaf-rhachis with detached leaflets. It is probably *C. afrofistula*. The notes accompanying it state that it grows in sand and is very common on all the islands in the Delta.

Pedro & Pedrogão 4670 (Portuguese East Africa, Niassa, Mogincual, frt. 26 July 1948) in the East African Herbarium is *C. afrofistula* but I am uncertain which variety.

Cassia italica (*Mill.*) *Lam. ex F. W. Andr.*, Fl. Pl. Anglo-Egypt. Sudan **2,** 117 (1952).

The plant commonly called *C. aschrek* Forsk. or *C. obovata* Collad., but whose correct name is *C. italica*, has a vast geographical range from North to South Africa and through the Middle East to India. Its obovate leaflets and characteristic pods with little crests along the middle of each valve usually make its identification easy, except in places where *C. truncata*, described elsewhere in this paper, may occur; but within the species there is a remarkable range of variation, especially noticeable in the length of the racemes and the size of the flowers. This seems never to have been properly analysed. The reason for studying this was the necessity to decide how to treat the East African material of this species, whose flowers are uniformly very much smaller than those of North African specimens. Bischoff, in Bot. Zeit. **8,** 881–884 (1850), split *C. obovata*, as he called it, into three varieties, based principally on the outline of the leaflets. I have not found leaflet-shape to be correlated with other characters, and Bischoff's classification does not give satisfactory results.

Examination of the very rich material in the Kew herbarium has shown that the size of the inflorescence and flowers and the length of the petiole are taxonomically important characters. Using these, one can recognise three races of *C. italica* whose geographical ranges although contiguous or overlapping are mostly distinct, and which it is appropriate to recognise as subspecies. The position can be summarised as follows: there is a race, occupying the northern part of the range of the species, with long petioles, long inflorescences and large flowers; another, principally in East Africa, with long petioles, short inflorescences and small flowers; and a third race, mainly in South Africa, with generally short petioles, long inflorescences and rather small flowers. Indian material, with a few exceptions, appears to be the same as East African race. These characters are not all constant, and that is one of the reasons for considering these races to be no more than subspecies.

Cassia italica.

subsp. **italica.**

Senna italica Mill., Gard. Dict.., ed. 8, no. 2 (1768).

Cassia aschrek Forsk., Fl. Aegypt.-Arab. 86 (1775).

C. obovata Collad., Hist. Cass. 92, t. 15A (1816), *nom. illegit.*

C. obtusata Hayne, Arzneyk. Gewächse **9,** t. 43 (1825).

C. obovata var. *genuina* Bischoff in Bot. Zeit. **8,** 882 (1850) [cited as of Bischoff, Med.-Pharm. Bot. 14, not seen].

C. obovata var. *obtusata* (Hayne) Bischoff in Bot. Zeit. **8,** 883 (1850) *pro parte*. [Bischoff attributes the var. to Vogel, Syn. Gen. Cass. 36 (1837), but Vogel had it incorrectly as '*β* C. obtusata Hayn.' Bischoff also cites his Med.-Pharm. Bot., which I have not seen].

Senna obovata (Collad.) Batka var. *genuina* Batka, Monogr. Cassien Gruppe Senna 46 (1866).

Senna obovata (Collad.) Batka var. *pilosa* Batka, Monogr. Cassien Gruppe Senna 33, 49 (1866).

Indumentum appresse puberulum, raro plus minusve patens et pubescens. Petioli plerumque 1–3·5 cm. longi. Racemi 6–23 cm. longi, plerumque folia subtendentia excedentes, nonnunquam subaequilongi. Flores majusculi vel magni. Sepala 8–13 mm. longa. Petala 9–20 mm. longa, 5–10 mm. lata. Antherae magnae 8–14 mm. longae, mediocres 4–6 mm. longae, parvae 1·5–2·5 mm. longae.

The subsp. *italica* is widespread in northern Africa from the Cape Verde Islands, Senegambia and Rio de Oro to Egypt and Somaliland, occurring as far south as Nigeria, the Sudan and Ethiopia. It also occurs in the Middle East, in Israel, Arabia, Persia and Baluchistan. In all these territories it is the only subspecies of *C. italica* occurring, except for Somaliland and Ethiopia where a few specimens have been collected of the following subspecies *micrantha*, under which they are cited. Subsp. *italica* just reaches north-western India in Sind (Kotri, *Rich* 430) and perhaps the Punjab (Tehsile Khushal, *Drummond* 23665); other Indian material appears to be subsp. *micrantha*. It does not seem necessary to give detailed citations of specimens of subsp. *italica*, especially as its geographical range overlaps that of subsp. *micrantha* so little.

The principal variation within subsp. *italica* is that the indumentum may be appressed-puberulous (this is the most frequent sort) or just occasionally shortly spreading-pubescent (e.g. *Dawe* 12, Israel, and *Schimper* 303, Arabia, Wadi Gurra, the latter one of the syntypes of *Senna obovata* var. *pilosa* Batka.) This does not seem worth taxonomic recognition. Nor does the rather wide range in flower-size in subsp. *italica*, which may well be controlled by season or habitat.

Some comments on the application of the name *Cassia italica* and its synonymy are desirable. Miller (Gard. Dict. ed. 8, no. 2: 1768) remarked of *Senna italica* that its flowers 'are shaped like those of the first sort, but are larger, and of a brighter yellow colour.' The 'first sort' is *Senna alexandrina* (i.e. *Cassia senna* L.). Although I have not found any type of *italica* in the herbarium of the British Museum (Natural History), the subspecies here called *italica* is the only one of the three which Miller's comment could possibly fit. I have examined the holotype of *C. aschrek* (Arabia, Mor, *Forskal*), kindly lent by the Botanical Museum and Herbarium, Copenhagen. *C. obovata* and *C. obtusata* were both published with pictures, which enable their exact identity to be settled, and the former name is anyhow illegitimate.

Batka, Monogr. Cassien Gruppe Senna, 46–49 (1866) gives extensive additional synonymy under *Senna obovata*, much of which doubtless applies to *C. italica* subsp. *italica*. This, however, will not affect the subspecific names, and the detailed working out may well be left to a monographer.

subsp. **micrantha** *Brenan*, subsp. nov.

Indumentum appresse puberulum. Petioli plerumque 1–2·5 cm. longi. Racemi 2–8 cm. longi, quam folia subtendentia breviores. Flores parvi. Sepala 5–8 mm. longa. Petala 8·5–9 mm. longa, 3·5–4·5 mm. lata. Antherae magnae 5·5–6 mm. longae, mediocres 2·5–3·5 mm. longae, parvae 1·25 mm. longae.

Ethiopia. E. Harar, edge of plateau, fl. & frt. May 1943, *Hummel* 88 (EA):—very low shrub 15 cm. off ground, growing along ground; whitish flowers.

British Somaliland. 45° 9′ E., 8° 37′ N., Boundary Pillar 93, 1000 m., fl. 5 Oct. 1932, *Gillett* 4151:—bare ground in *Commiphora-Acacia* open scrub; flowers pale: vernacular name 'jalelo'. Gore Tog, c. 1680 m., fl. 28 Aug. 1952, *Hemming* 131 (EA):—in mixed bush, *Acacia bussei* dominant; ribbed fruit; yellow flowers: vernacular name 'chalelo'.

Uganda. Karamoja District: Lalachat, fl. Feb. 1936, *Eggeling* 2805:—undershrub to 60 cm.; flowers yellow-green.

Kenya. Northern Frontier Province?: Lake Rudolf, near spring, 360 m., fl. 23 Aug. 1944, *Mrs. Joy Adamson* 30 *in Herb. Bally* 3578 *in C.M.* 16229 (EA, K):—small shrub 60 cm. high. Turkana District: Suguta Valley, 460 m., *Champion* T. 39:—on lava soil. Turkana Province: 40 km. S.W. of Lodwar, 550 m., fl. & fr. 12 May 1953, *Padwa* 144 (K, holotypus subspeciei):—stony desert with scattered bush and scrub. Baringo District: Maji ya moto, Kamasia, 1070 m., fl. & frt. 16 July 1945, *Bally* 4523 *in C.M.* 12344 (EA, K):—herbaceous annual, not common. Masai District: New Magadi road, mile 45, 1160 m., frt. 12 Mar. 1939, *Bally in C.M.* 8520 (EA, K):—in dry river-bed; erect herb 20 cm. high. Plains between Uaso Nyiro and Nguruman, 760 m., frt. 18 July 1944, *Bally* 3177 *in C.M.* 11897 (EA):—rare in grassland with *Acacia tortilis* subsp. *spirocarpa*; low shrublet to 30 cm. Plains between Hayton's Falls and Nguruman Escarpment, 640 m., fl. 8 Oct. 1944, *Bally* 3882 *in C.M.* 16261 (EA, K):—flowers very pale yellow. Ol lorgosailic plains, 1160 m., fl. 20 July 1947, *Bally* 5137.

Tanganyika. Shinyanga, fl. & frt. 25 Jan. 1933, *Bax* 111 & received Nov. 1938, *Koritschoner* 1853 (EA, K). New Shinyanga, 1100 m., fl. & frt. 10 May 1945, *Greenway* 7440 (EA, K):—common but scattered in *Brachiaria*, *Chloris virgata*, *C. pycnothrix*, *Tragus racemosus*, *Bothriochloa insculpta*, *Aristida* and *Eragrostis* spp. grassland on a reddish-brown sandy clay loam with *Acacia senegal*, *Ormocarpum*, *Acacia* sp. open and scattered scrub-bush with *Sorghum*, *Pennisetum*, maize cultivations; a slightly branched procumbent, annual or perennial herb with very pale yellowish-white and purple-brown streaked flowers. Masai District: Kitumbeine, 1220 m., fl. 7 Jan. 1936, *Greenway* 4287:—a perennial herb up to 15 cm. tall with pale yellow flowers, growing amongst stones in a brown volcanic soil in association with *Tribulus terrestris*, not at all common: vernacular name (Kimasai) 'osuneute'. Engaruka, 1830 m., fl. & frt. 21 June 1951, *Olga Corbett* 26:—open grass and bushland on sandy soil; three plants only seen, 30 cm. high; flower pale yellow.

Bechuanaland. Kwebe Hills, 910 m., fl. 1 Mar. 1898, *Lugard* 201:—plant to 25 cm.; flowers pale yellow.

South West Africa. Haikamchab (60 km. inland from Swakopmund), fl. & frt. 27 Jan. 1907, *Galpin & Pearson* 7619. Shale plains N. of Gelwater, fl. 12 Dec. 1915, *Pearson* 9225:—branches prostrate; flowers very pale yellow. Karibib, alluvium, fl. & frt. Feb. 1934, *Dinter* 6989. Grootfontein, fl. Dec. 1934, *Schoenfelder* 981:—flat on ground; flowers cream; rootstock tuberous, up to 60 cm. deep; on red loamy soil.

Transvaal. Pretoria, Pienaar's River Station, hotel yard, 1090 m., fl. Oct. 24, 1907, *Burtt Davy* 7040:—flowers yellow. [Determination doubtful].

In addition to the African material cited above, the majority of Indian specimens of *C. italica* seem to be best placed under subsp. *micrantha*. As Indian material is abundant, it does not seem necessary to cite it all. There are specimens at Kew from the North-West Frontier Province (*Deane* s.n.), Sind (*Stearn* 6), Bombay (*Stocks* 482), Madras (*Wight* 857, *Gamble* 17103). Indeed it is probable that, except in Sind and perhaps the Punjab, subsp. *micrantha* is the only race of *C. italica* that occurs in India.

There are two African specimens from territories from which I have not seen undoubted *micrantha*, which have short inflorescences and may well be *micrantha* but which lack open flowers and are thus doubtful: Angola, *Welwitsch* 1726, and Senegambia 1837, without collector, in *Herb. Hooker.* It is quite possible that *C. obovata* var. *platycarpa* Bischoff in Bot. Zeit. **8,** 883 (1850) (*Senna obovata* var. *platycarpa* (Bisch.) Batka, Monogr. Cassien Gruppe Senna, 33, 50: 1866), based on a Senegambia specimen in the Paris Herbarium collected by Leprieur and Perrottet and described as having racemes subequalling or shorter than the leaves, is really *micrantha.* In response to a request to the Director of the Muséum National d'Histoire Naturelle at Paris for the type of var. *platycarpa* to be lent, four specimens, all collected from Senegambia by Leprieur or Perrottet, were kindly dispatched. None was labelled *platycarpa*; one, excepting a single fragment of an inflorescence, was not *italica* at all; a second was *C. italica* subsp. *italica*; the other two, both bearing flower-buds and fruits, might either do for the type of *platycarpa,* although one (Sénégal, *Leprieur*, with 'Herbarium Richard' in red ink on the label) agrees rather better with Bischoff's description. In the absence of flowers, and of other confirmatory specimens from Senegal, I hesitate to equate *platycarpa* and subsp. *micrantha* with certainty.

C. obovata var. *pallidiflora* Dinter, in Fedde, Repert. **15,** 355 (1918), is also most probably subsp. *micrantha.* Its flowers were said to be smaller and pale yellow with darker venation. Unfortunately the syntypes are no longer in existence at Berlin, and duplicates have been looked for in vain in the herbaria at Hamburg, the British Museum (Natural History) and Kew.

subsp. **arachoides** (*Burch.*) *Brenan,* subsp. et comb. nov.

Cassia arachoides Burch., Trav. **1,** 341 (1822).

Indumentum saepius breve, sparsum, patens, rarius densum vel appresse puberulum. Petioli plerumque 0·3–1·2 cm. longi, sed nonnunquam longiores. Racemi 7–22 cm. longi, plerumque folia subtendentia excedentes. Flores mediocres vel parvi. Sepala 8 mm. longa. Petala 10–12 mm. longa, 5–6 mm. lata. Antherae magnae 8 mm. longae, mediocres 2·5–3 mm. longae, parvae 1 mm. longae.

Subsp. *arachoides* inhabits southern Africa, from Bechuanaland (Metsimaklaba near Gaberones, *van Son* 28916, Ghanzi, *de Beer* D 45) and South-West Africa (Nukleft Mountains (N.E.) Kabiras, *Pearson* 9092, Tsumis, Windhoek–De Aar railway, *Durham* 12, Rehoboth, *Rodin* 2767), in both of which territories subsp. *micrantha* also occurs, to South Africa. All South African material seen, with the solitary exception of the Pretoria specimen cited, with some doubt, under subsp. *micrantha*, belongs to subsp. *arachoides*, and it is therefore not necessary to cite it in detail.

Typical subsp. *arachoides*, of which the holotype, *Burchell* 1680, Griqualand West, is at Kew, has short rather sparse spreading indumentum and relatively short petioles, and there is much South African material corresponding with this.

There are, however, certain variants or forms which require mention:—

(1) With dense spreading obvious pubescence. Petioles short as in typical *arachoides.* Three Transvaal specimens seen: near Pietersburg, *Hutchinson* 2287, between 'Zoutpan' and Waterpoort, *Obermeijer, Schweickerdt & Verdoorn*

265, Botanical Reserve, Messina, *I.B.P.E.* 1914 & 1925. These probably correspond with *C. obovata* var. *pilosa* Burtt Davy, Fl. Transv. **2,** xix (1932) (non *Senna obovata* var. *pilosa* Batka). These strongly pubescent plants are probably no more than a variant of subsp. *arachoides.*

(2) With the indumentum composed of numerous extremely minute hairs, to see which clearly a lens of × 20 magnification is desirable. Petioles and pods as in typical *arachoides.* Specimens seen from the Transvaal (Lydenburg District, *Barnard & Mogg* 966, Nelspruit District, *Codd & de Winter* 5009) and Natal (*Trapnell* 744).

(3) Characters of (2) except that the pods lack the line of crests running along the middle of each valve. This is *C. obovata* var. *mucronata* Burtt Davy, (Fl. Transv. **2,** xix (1932), based on *Galpin* 750!, Transvaal, Barberton District, Queen's River. Again, probably no more than a chance variant of *C. italica.*

(4) There are a few perplexing specimens showing petioles longer than usual, to 1·7 cm. These may otherwise closely resemble typical *arachoides* e.g. Griqualand West, Herbert Div., *Burchell* 1764, Transvaal, S.A. Lombard Nature Reserve, *Leistner* 53; or the variant 2) above, e.g. Portuguese East Africa, Sul do Save, between Boane and Goba, *Myre & Carvalho* 1376, between Lourenço Marques and Namaacha, *Torre* 1779, Southern Rhodesia, Gwanda District, Chimameli Camp, *R. M. Davies* 2382, Transvaal, Magaliesburg, N. side near Crocodile R., *Zeyher* 556, Warmbaths, *Leendertz* 1316, Zoutpansberg, *Lang* 32181, Pretoria, *Wasserfall & v. Niekerk* 42. These long-petioled leaves may be perhaps produced normally on young shoots of *arachoides*, but the possibility of introgression from subsp. *micrantha* must be taken into account.

Cassia senna *L.*, Sp. Pl. 377 (1753).

C. angustifolia Vahl, Symb. **1,** 29 (1790).

C. acutifolia Del. Fl. Aegypt. Ill. 61, t. 27 (1813).

The first work to recognise that Linnaeus's *Cassia senna* is the earliest name for the species commonly called *C. acutifolia* Del. appears to be F. W. Andrews, Fl. Pl. Anglo-Egyptian Sudan, **2,** 118, 120 (1952). Examination of material called *C. acutifolia* and *C. angustifolia* from north eastern Africa and Arabia shows that the distinguishing characters assigned to these two species are quite inconstant, and that there seems no reason for recognizing them even as varieties. The only absolute distinction that Bentham (in Trans. Linn. Soc. **27,** 553: 1871) was able to draw between them were that the pods of *C. acutifolia* were subfalcate and 9–12 lines wide, while those of *C. angustifolia* were straightish and 7–8 lines wide. Both of these names are best referred to the synonymy of *C. senna.*

There is, however, one variant of *C. senna*, hitherto undescribed, which is worth taxonomic recognition, and is described below as var. *obtusata.*

var. **senna**

Foliola plerumque apicem acutum vel subacutum versus angustata, ibi distincte et tenuiter 0·5–1 mm. longe mucronata. Pedicelli glabri usque sparse pubescentes. Legumina sparse puberula vel pubescentia.

Var. *senna* is found from the central Sahara eastwards to Arabia and India, extending southwards in Africa to the Sudan, Eritrea and French and British Somaliland. It has been found on the coast of Kenya and in Portuguese East Africa, but in these places may well be an introduction.

There is a good deal of variation within var. *senna*: the indumentum may be appressed or spreading, the leaflets vary much in length and width, and the pods vary in width and may be straight or curved.

var. **obtusata** *Brenan*, var. nov.

Foliola apice plerumque rotundata vel obtusa, saepius haud mucronata vel mucrone brevi usque ad circiter 0·5 mm. longo praedita. Pedicelli et legumina dense puberuli vel pubescentes.

Indumentum semper appressum. Foliola [1–] 1·3–1·8 [–2·5] cm. longa, [0·4–] 0·5–0·7 [–1·1] cm. lata. Legumina [2·5–] 3·8–4·1 [4·3] cm. longa, [1·7–] 2·2–2·4 cm. lata.

ETHIOPIA. Ogaden, N. of Ferfer, 45° 10′ E., 5° 20′ N., frt. 28 Oct. 1954, *Ellis* 335:—occasional shrub up to 75 cm.; flowers not seen.

BRITISH SOMALILAND. Somaliland boundary, 45° 15′ E., 8° 58′ N., 1280 m., fl. & frt. 30 Sept. 1932, *Gillett* 4100 (K, holotypus varietatis):—suffruticose; flowers yellow; in shallow soil in *Acacia*-grass veldt (*Acacia bussei* association); dried leaves mixed with tea for stomach complaints as laxative: vernacular name 'jalelo gel'. Hargeisa, frt. 14 Jan. 1944, *Bally* 3769 *in C.M.* 16256 (EA, K):—on gravelly soil. Same locality and date, *Bally in C.M.* 11857, *pro parte* (EA). Darkainta, 560 m., fl. 22 Oct. 1954, *Bally* 10156:—on rocky limestone soil; erect herb 60 cm. high, leaves greyish-glaucous; flowers yellow. Eastern Al Madu Range, on rocky ground near Baditir, 900–1130 m., fl. 8 Oct. 1956, *Bally* 10956:—procumbent; rootstock and main stem woody; flowers pale yellow; fairly common and widespread.

SOMALIA. Buloburti region, between Afgoi Addo and Gialassi, frt. 26 Mar. 1933, *Suckert* 34: shrub: vernacular name 'ueghei'. Mahaddei Uen, fl. & frt. 3 Jan. 1944, *Bally* 3750 *in C.M.* 11856 (EA, K):—common by roadside on sandy soil. 32–48 km. S. of Belet Uen, fl. & frt. 2 Nov. 1952, *Hemming* 132 (EA): –in thick bush of mixed *Acacia-Commiphora* spp.; flowers yellow: vernacular names 'chelelo' or 'jalelo gel'.

KENYA. Lorian, end of Golana Gof, 90 m., fl. 19 Jan. 1943, *Bally* 2109 in *C.M.* 12641 (EA, K):—in grassland. Between Banessa and Ramu, 3° 51′ N., 41° 7′ E., c. 560 m., fl. 23 May 1952, *Gillett* 13281:—in *Commiphora*-bush *Acacia* open scrub in shallow pale soil on limestone slopes; suffruticose; flowers yellow.

It has not been altogether easy to reach a decision about the taxonomic rank or position to be assigned to var. *obtusata*. In its general appearance it is very similar to *Cassia holosericea* Fres. from India, Arabia, the Sudan, Ethiopia and British Somaliland, and it is very understandable that specimens of var. *obtusata* have been often misidentified with *C. holosericea*. There are, however, important differences between them: *C. holosericea* is pubescent with short spreading hairs, while var. *obtusata* is puberulous with appressed hairs; *C. holosericea* has small pods about 1·2–1·5 cm. wide, while those of var. *obtusata* are 1·7–2·4 cm. wide; the leaflets of *C. holosericea* are in 4–8, very rarely 9, pairs per leaf, while plants of var. *obtusata* seem always to have some leaves with at least 9 and usually 10–13 pairs of leaflets. The difference in the indumentum of the two is particularly well shown on the pedicels: those of *C. holosericea* being densely spreading-pubescent, while the hairs on the pedicels of var. *obtusata* are ± appressed and usually less dense.

The var. *obtusata* differs from *C. senna*, under which it is placed, mainly by the leaflets being rounded or obtuse at the apex and more shortly or not at all mucronate; also by the indumentum on the pedicels and pods being denser.

In the shape of its leaflets and in the denser indumentum var. *obtusata* is intermediate between *C. senna* and *C. holosericea*, and a case might be made out for describing it under either. However, the differences from *C. senna* are fewer and less significant, I consider, than from *C. holosericea*. Also, the leaflets of *C. senna* var. *senna* are sometimes nearly obtuse, a factor in favour of *obtusata* being no more than a variety.

There is no evidence at present for *obtusata* being a product of crossing between *C. senna* and *holosericea*. In fact the latter is unknown in Kenya, where *obtusata* has been collected. It is possible that *C. holosericea* may itself be a race of *C. senna* taken in a very wide sense, but at present I do not accept that.

Cassia truncata *Brenan*, sp. nov.; inter *C. longiracemosam* Vatke et *C. italicam* (Mill.) Lam. ex F. W. Andr. ponenda; ab illa ramulis et axibus inflorescentiarum pilis densioribus et brevioribus puberulis, stipulis erectis patentibus vel recurvato-patentibus sed haud abrupte reflexis, foliolis plerumque manifeste obovatis apice truncatis usque retusis, leguminibus ubique puberulis linea cristarum obtusarum et humilium medio in valvae ornatis, seminibus areolis minoribus et supra areolas scamno transverso ornatis; ab hac habitu manifestius fruticoso, inflorescentiis plerumque longioribus, leguminibus rectis ubique puberulis linea cristarum utrinque ornatis distinguenda. Praeterea a varietatibus fere omnibus *C. italicae* indumento patenti distincta.

Frutex parvus, usque ad [45–] 90 cm. altus. *Ramuli*, sub lente visi, minute sed densissime patenter puberuli, eglandulosi, leviter striatuli, in statu sicco pallide viridi-straminei. *Folia*: stipulae [erectae], suberectae usque recurvato-patentes, anguste lanceolato-triangulares vel subulato-lanceolatae, acuminatae, 1–3-nerviae, ubique dense puberulae, 4–9 [–11] mm. longae, basim versus 0·75–1·5 mm. latae; petiolus 1–3 [–4] cm. longus, perbreviter pubescens, supra anguste canaliculatus, eglandulosus; rhachis [2–] 4–12·5 [–21] cm. longus, more petioli vestitus, eglandulosus; foliola [3–] 4–9-juga, petiolulis 0·5–1·5 mm. longis breviter pubescentibus suffulta, rigide papyracea, siccitate pallide viridia, subtus ut videtur glaucescentia, obovato-elliptica usque obovato-oblonga, 8–25 [–30] mm. longa, 6–20 mm. lata, apice plerumque truncata usque retusa et ibi mucrone usque ad 1 mm. longo saepe praedita, basi asymmetrica plerumque plus minusve rotundata, ubique breviter pubescentia vel puberula pilis haud appressis, costa et nervis lateralibus primariis utroque costae latere (3–) 5[–8] utrinque sed praesertim subtus prominulis. *Racemi* axillares, praesertim apices ramulorum versus enascentes; pedunculi 5·5–12·5 [–13·5] cm. longi, teretes, puberuli; racemi ipsi [5–] 11·5–30 cm. longi, axibus puberulis; bracteae ovato-acuminatae, 5 [–7·5] mm. longae, 3–3·5 mm. latae, breviter pubescentes; pedicelli 4–8 mm. longi. *Sepala* utrinque plus minusve puberula, elliptica vel obovato-elliptica, 10–12 [–13] mm. longa, 7–9 mm. lata, in statu sicco atrobrunnea, pallide marginata. *Petala* lutea (in statu sicco atrovenosa), obovata, 17–21 mm. longa, 7–14 mm. lata, apice rotundata, basi in unguem circiter 2 mm. longum gradatim angustata. *Stamina* 10, filamentis rectis vel subrectis; antherae 2 magnae curvatae, circiter [10–] 11–14 mm. longae, 2–2·5 mm. latae, birimosae, filamentis circiter 3–3·5 mm. longis; antherae 5 mediocres subrectae, 4·5–5·5 mm. longae, filamentis 2–2·5 mm. longis, sed eo stamini

antici 5 mm. longo; antherae 3 parvae curvatae, 1·75 mm. longae, filamentis 2 mm. longis. *Ovarium* dense et patenter puberulum, circiter 8–12 mm. longum et 1·5–2·5 mm. latum, basi circiter 3–4 mm. longe stipitatum, apice in stylum glabrum circiter 8 [–10] mm. longum attenuatum. [*Legumina* dehiscentia, recta, subcoriacea, applanata, oblonga, 2–7 cm. longa, 1·5–1·9 cm. lata, apice apiculata, basi circiter 4–5 mm. longe et abrupte stipitata, brunnea, ubique patenter puberula, valvis tenuiter transverse venosis medio linea cristarum longitudinalium circiter 1 mm. altarum obtusarum supra semina posita ornatis. *Semina* brunnea, reticulata, irregulariter oblonga vel oblongo-ovata, prope hilum apiculata, extremo hilum adversus retuso, 5–6 mm. longa, 3·5–4 mm. lata, 2·5–3 mm. crassa, utrinque areolo parvo 1 mm. longo 0·5 mm. lato notata etiam supra areolum scamno transverso praedita.

Ethiopia. Ogaden: Wardere, 210 m., fl. 15 Aug. 1941, *Peck* 43 (EA, K):—erect, thin bush about 75 cm. high; good grazing by all stock; the beans are eaten by the Somalis; the dried leaf is beaten and then boiled with water and cooled; it is then drunk as a purgative; it is bitter and strong; a double handful of leaves constitutes a dose: vernacular name (Somali) 'jalelo'. 16 km. W.S.W. of Wardere, 6° 20′ N., 44° 40′ E., in more open parts of bush country with many tall trees on red sandy soil, 760 m., fl. & frt. 23 Oct. 1953, *Ellis* 153:—woody herb to 1 m. high; bright yellow flowers. Between Beira and Duyerali, N. of Galcaio, 430 m., fl. 7 Feb. 1954, *Bally* 9613 *in C.M.* 20886 (EA, K):—common small shrub on roadside; flowers bright yellow; widely spread in Somalia. 9 km. S. of Bokh, 460 m., fl. 22 Oct. 1954, *Bally* 10153:— roadside herb to 60 cm. high; flowers yellow. Wardere district, 7° N., 45° 20′ E., in open bush on sandy soil, 610–760 m., fl. & young frt. 20 Nov. 1954, *Ellis* 325 (K, holotypus):—small shrub up to 1 m., common round Wardere, rare elsewhere; bright yellow flowers; very beany smell.

British Somaliland or Ethiopia. The Haud, 610 m., fl. May, 1932, *Godfrey Fausset* 60:— about 1 m. high; apparently a strong purgative; the Somalis cook the leaves and drink the resultant water: vernacular name 'jalelo'.

British Somaliland. Godka Dudkalka monument, fl. 22 Oct. 1944, *Glover & Gilliland* 173 (BM, EA, K):—small branching bush of 45-60 cm.; in open country: vernacular name 'jalelo ari'.

Somalia. Near Galcaio, fl. & frt. 17 Oct. 1951, *Bond & Pechanec* 69 (EA).

Cassia humifusa *Brenan*, sp. nov.; affinis ut videtur *C. longiracemosae* Vatke, sed caulibus prostratis, foliolis apice acutis vel subacuminatis, stipulis uninerviis, axibus inflorescentiarum dense pubescentibus, petiolis saepius sed haud semper brevioribus differt.

Herba vel nonnunquam ut videtur leviter lignosa, caulibus prostratis usque ad 40 [–80] cm. vel ultra longis, pilis patentibus dense et persistenter pubescentibus eglandulosis. *Folia*: stipulae plus minusve persistentes, mox reflexae, anguste lanceolato-triangulares [vel majores anguste oblongo-triangulares], apice saepissime subulato-acuminatae, nervo longitudinali percursae, 6–9 [–13] mm. longae, 1·5–2 [–3] mm. prope basim latae; petiolus 3–9 [–14] mm. longus, pubescens, eglandulosus; rhachis [5–] 8–11 [–13·5] cm. longus, pubescens, eglandulosus (corpusculis minutis rubidis apud insertiones foliolarum fasciculatis exceptis), supra canaliculatus; foliola [6–] 11–12-juga, petiolulis 1–1·5 mm. longis pubescentibus suffulta, papyracea, lanceolata vel elliptico-lanceolata, 1·1–2·6 [–3·5] cm. longa, 0·3–1 [–1·6] cm. lata, apice acuta vel subacuminata et ibi etiam saepe breviter mucronata, basi rotundata [vel rotundato-cuneata], utrinque breviter pubescentia, costa et nervis lateralibus primariis utroque costae latere 5–7 utrinque sed praesertim subtus prominulis. *Racemi* axillares, erecti; pedunculi [6–] 9–13 [–15] cm. longi, pubescentes; racemi ipsi 5–9 cm. longi, axibus dense pubescentibus; bracteae [ovato-acuminatae, 3·5–5 mm.

longae, basim versus 2·5–3 mm. latae, pubescentes]; pedicelli 4 [–5] mm. longi, dense pubescentes. *Sepala* intus glabra, extra glabra vel obscure puberula, obovato-elliptica, 10–12 mm. longa, 5–6 mm. lata, apice rotundata, saltem in statu sicco brunnea vel atrobrunnea, pallide marginata. *Petala* lutea (in statu sicco atrovenosa), obovata, 16–20 mm. longa, 9–11 mm. lata, apice rotundata, basi in unguem 1·5–3 mm. longum rotundato-cuneata. *Stamina* 10, filamentis rectis vel subrectis; antherae 2 magnae curvatae, 8–9 mm. longae, 2·5–3 mm. latae, birimosae, filamentis 3–3·5 mm. longis; antherae 5 mediocres subrectae, 3·5–4 mm. longae, filamentis 1·5–2 mm. longis sed eo staminis antici 3 mm. longo; antherae 3 parvae superne curvatae, 2 mm. longae, filamentis 1·5–2 mm. longis. *Ovarium* ubique dense et breviter pubescens, circiter 7–10 mm. longum et 1–1·5 mm. latum, basi circiter 1·5–3 mm. longe stipitatum, apice in stylum 6–9 mm. longum basi excepto glabrum angustatum. *Legumina* matura nondum visa.

KENYA. Northern Frontier District: Wajir, on sandy soil, fl. 24 Dec. 1943, *Bally* 3730 *in C.M.* 16258 (EA, K):—common decumbent shrublet. Wajir, growing on sand and limestone, 490 m., fl. Jan. 1949, *Dale* K. 705 (EA, K):—procumbent herb; corolla yellow. Wajir, 610 m., fl. 21 June 1951, *Kirrika* 50 (EA, K):—creeping on the ground; flowers yellow: vernacular name (Somali) 'salamaka'. 29 km. N.E. of Wajir, 40° 17′ N., 1° 52′ E., on red sandy soil, 270 m., also abundant at Wajir, fl. 27 May 1952, *Gillett* 13361 (K, holotypus, BM, EA, isotypus):—prostrate; flowers bright yellow; apparently not grazed. Wajir, on red sandy soils in spaced *Acacia tortilis*, *Delonix elata*, *Commiphora* bush etc., 210 m., fl. Jan. 1955, *Hemming* 430 (EA, K):—procumbent plant covering several square yards; flowering shoots erect; flowers yellow: vernacular name 'sanamaki'.

There can be little doubt that the closest relative of *C. humifusa* is *C. longiracemosa* Vatke. *C. humifusa* differs from the other species in having prostrate, not erect stems, leaflets acute or subacuminate at the apex, stipules with a single longitudinal nerve, densely pubescent inflorescence-axes, and, usually but not always, shorter petioles. The shape of the leaf-apex mentioned above does not take account of the sharp mucro often present in both species; the lamina below the mucro in *C. longiracemosa* is subacute or rounded.

Only very young pods of *C. humifusa* are available for study. They are flattened, straight or slightly curved, and pubescent; there is no sign of a crest. In fact they are similar, except for being more pubescent, to pods of *C. longiracemosa* at a comparable stage of development.

C. humifusa has so far been found only at and near Wajir.

Cassia ellisae *Brenan*, sp. nov.; *C. longiracemosae* Vatke affinis, ramulis glabris nec pubescentibus, ramis lignosioribus, petiolis plerumque brevioribus, stipulis brevioribus haud reflexis, foliolis marginibus exceptis glabris, pedicellis glabris longioribus, floribus saepe majoribus, antheris magnis longioribus apicem versus magis attenuatis, ovariis glabris, leguminibus saepe latioribus cum marginibus rectis vel subrectis facillime distinguenda.

Arbor parva [vel frutex] usque ad [1–] 1·5 [–3] m. altus. *Ramuli* juveniles glabri, pruinosi, teretes; vetustiores mox lignescentes, grisei usque brunnei, subtiliter lineolati, aliter sublaeves. *Folia*: stipulae erectae, anguste ovato-acuminatae, plurinerviae, marginibus ciliolatis sed aliter subglabrae, 2–5 [–5·5] mm. longae, prope basim obliquam 1·5–1·75 mm. latae; petiolus [4–] 6–9 [–10] mm. longus, velut rhachis [2·5–] 3–5 cm. longus valde sparse et breviter puberulus vel fere glaber, supra canaliculatus, eglandulosus; foliola 5–7 [–9]-juga, petiolulis brevissimis 0·5 mm. longis suffulta, rigide

papyracea, siccitate pallide viridia, obovato-elliptica [vel elliptica], 3·5–8·5 [–11] mm. longa, 2·5–6 mm. lata, apice rotundata usque subacuta ibi mucrone acuto 0·5–1 mm. longo desinentia, basi leviter asymmetrico latere antico saepius cuneata, latere postico saepius leviter rotundata, glabra vel marginibus perinconspicue ciliolatis, costâ et nervis lateralibus utroque costae latere 3–5 erecto-ascendentibus utrinque prominulis. *Racemi* axillares, praesertim apices ramulorum versus orientes; pedunculi 5–7·3 cm. longi, validi, teretes, glabri; racemi ipsi [5–] 9–19 [–30] cm. longi, axibus glabris; bracteae [ellipticae, circiter 10 mm. longae et latae, apice rotundatae, marginibus ciliolatis exceptis glabrae;] pedicelli glabri, 5–10 mm. longi. *Sepala* utrinque glabra, elliptica vel obovato-elliptica, 13–16 mm. longa, 7–12 mm. lata, apice rotundata, in statu sicco pallida. *Petala* lutea (in statu sicco atrovenosa), obovata vel obovato-oblonga, 20–28 [–32] mm. longa, 8–17 mm. lata, apice rotundata, basi in unguem circiter 1·5–3 [–3·5] mm. longum attenuata. *Stamina* 10, filamentis rectis vel subrectis; antherae 2 magnae curvatae, circiter 13–15 mm. longae, 3 mm. latae, birimosae, filamentis 5 mm. longis; antherae 5 mediocres subrectae, 6–6·5 mm. longae, filamentis 2–3 mm. longis, sed eo staminis antici 5 mm. longo; antherae 3 parvae superne curvatae, 2–3 mm. longae, filamentis 2–2·5 mm. longis. *Ovarium* glabrum, circiter 10–15 [–18] mm. longum et 1·5–2·5 [–3] mm. latum, basi circiter 3 mm. longe stipitatum, apice in stylum glabrum circiter [10–] 12 mm. longum attenuatum. *Legumina* dehiscentia, recta, subcoriacea, applanata, oblonga, 4·5–6·7 [–7·5] cm. longa, [1·5–] 2–2·5 cm. lata, apice rotundata, basi circiter 5 mm. longe abrupte stipitata, viridibrunnea, [serius brunnea], glabra, valvis nitidis tenuiter subtransverse venosis supra semina scamnis fere transversis paulum obliquis atropurpureis ornatis. [*Semina* nigrescentia, reticulata, oblonga, prope hilum apiculata, extremo hilum adversus retusa, 8 mm. longa, 4 mm. lata, 2 mm. crassa, utrinque areolo 2·5–3·5 mm. longo 0·6 mm. lato notata.]

ETHIOPIA. Ogaden: between Wardere and Walwal, fls. & frt. 25 Nov. 1944, *Glover & Gilliland* 337 (BM, EA):—large, bushy, very floriferous plant 0·9–1·2 m. high; leaves glaucous; flowers golden, striped with brownish purple: vernacular name 'jalello gil'. S.W. El Rago, 6° 33′ N., 45° 43′ E., in open bush, rare, 760 m., fl. 4 Nov. 1953, *Ellis* 236:—small tree up to 3 m. high; bright yellow flowers; red-brown pods. 48 km. S. of Wardere, in *Commiphora* bush, frt. 26 Oct. 1954, *Hemming* 376:—bush to 1·8 m. South-west of Wardere, 7° N., 45° 10′ E., 610–760 m., occasional in medium bush on red sandy soil, fl. & young frt. 20 Nov. 1954, *Ellis* 327 (K, holotypus):—small tree up to 1·5 m.; bright yellow flowers. Wardere district, 7° N., 45° 20′ E., 610–760 m., occasional in medium bush on red sandy soil, fl. 20 Nov. 1954, *Ellis* 326:—small tree up to 2·4 m.; bright yellow flowers. Ogaden, without more precise locality, 1954, *Simmons* 96 (EA). W. of Shillave (Scillave), 44° 42′ E., 6° 25′ N., 400 m., rare in open bush on sandy soil, fl. Nov. 1955, *Ellis* 368:—bush up to 1·2 m., flowers bright yellow.

SOMALIA. Balad to Mahaddei Uen, fl. & young frt. 3 Jan. 1944, *Bally* 3751 *in C.M.* 16230 (EA, K):—small shrub. 32–48 km. S. of Belet Wein, 4° 27′ N., 45° 22′ E., 210 m., in mixed *Acacia-Commiphora* spp. thick bush, fl. & frt. 2 Nov. 1952, *Hemming* 130 (EA, K):—bush to 1·2 m.; flowers very bright yellow: vernacular name 'jalelo gel' or 'chelelo gel'.

Cassia ellisae is named after Dr. Peggy E. Ellis, of the Desert Locust Control, who has made important collections in the Ogaden, including the holotypes of two new species of *Cassia* published in this paper.

Cassia tora *L.* and **C. obtusifolia** *L.*

Cassia tora L. and *C. obtusifolia* L. were published simultaneously in 1753 by Linnaeus in the Species Plantarum on pages 376 and 377 respectively. In Bentham's admirable revision of the genus *Cassia* (Trans. Linn. Soc. London **27,** 535–6: 1871) *C. obtusifolia* was reduced to a synonym of *C. tora*,

and this has been followed by many subsequent authors. Recently, De Wit has published in Webbia, **11** (1955) an excellent account of the Malaysian species of *Cassia* in which, following earlier work by Prain and Backer, *C. tora* and *C. obtusifolia* are once again separated as distinct species. Certain comments must, however, be made on De Wit's account, from the points of view of taxonomy, typification and geographical distribution.

Taxonomy. I am in entire agreement with De Wit that *C. tora* and *C. obtusifolia* are two distinct species. De Wit (*l.c.* 230–231) separated the two in his key in the following way:—

'A gland between the leaflets of the two lower pairs. Pedicels 6–10 mm., stalk of pod 1–1½ cm. Foetid.' . . . . . *C. tora*

'A gland between the leaflets of the first pair only. Pedicels 13–23 mm., stalk of pod 2–3 cm. Smell weak.' . . . . . *C. obtusifolia*

African specimens of this group may be separated according to the number of glands on the leaf, but there appear to be no other distinctions between the plants so separated. In fact *C. obtusifolia* in Africa may have either one or two glands on each leaf, although in other parts of its range there is usually only one; however, certain specimens both from Asia and America show occasional leaves—usually, perhaps always, lower cauline ones—with two glands; examples in the Kew Herbarium are: Chota Nagpur, Ranchi, *Wood* L. 103–7, Trinidad, *de Schack s.n.* and Porto Rico, *Heller* 186. The distinction based on the pedicel-length appears valid, but one of the most important characters distinguishing *C. tora* and *C. obtusifolia* is unmentioned by De Wit. This is the structure of the seeds, which in both species have on each side a sharply delimited areole, of different colour from the rest of the testa. In *C. tora* this areole is 1·5–2 mm. wide, often almost as wide as the seed itself, while in *C. obtusifolia* the areole is in comparison very narrow, only 0·3–0·5 mm. wide, so that it appears linear. I have examined numerous fruiting specimens of both species, and this difference in the seeds was constant. In addition there is also a distinction in the stamens, which although appearing in De Wit's descriptions, is not emphasised as I think it deserves to be. These differences may be more clearly seen from the following table.

Cassia tora	*Cassia obtusifolia*
A gland between the leaflets of each of the two lower pairs.	A gland between the leaflets usually of the lowest pair only, but in Africa often and elsewhere rarely between each of the two lower pairs.
Pedicels (of flowers) 0·5–1 cm. long, (of pods) up to 1·5 cm.	Pedicels (of flowers) usually 1·2–3·5 cm. long, rarely as short as 0·5 cm., (of pods) 1·5–4·5 cm. long.
The three larger anticous anthers abruptly rounded at apex, not narrowed into a neck.	The three larger anticous anthers narrowed shortly below their apex like the neck of a bottle.
Areole on both sides of the seed 1·5–2 mm. wide, often almost as wide as the seed itself.	Areoles on both sides of the seed narrow, almost linear, 0·3–0·5 mm. wide.

The shorter pedicels of *C. tora* give a characteristic appearance to flowering specimens which usually enables them to be easily separated, with some practice, from *C. obtusifolia*.

Typification. De Wit (in Webbia, **11,** 277: 1955) gave as the holotype of *C. tora* the specimen in the Linnaean Herbarium numbered 528.9. There are, however, overwhelming objections to this: the specimen is marked 'Br.' indicating Patrick Browne, whose specimens were not acquired by Linnaeus until 1758. As Stearn remarks (Carl Linnaeus, Species Plantarum, Facsimile **1,** 108: 1957) 'none of these specimens should be taken as the type of species published by Linnaeus in 1753'. In addition, the specimen is not *C. tora* but *C. obtusifolia* in De Wit's sense! And, of course, as several elements entered into Linnaeus's conception of *C. tora* (see Sp. Pl. 376: 1753) the specimen could not be a holotype, but only a syntype or lectotype. De Wit's choice clearly cannot be accepted.

The Linnean phrase-name of *C. tora* is followed by references to '*Roy. lugdb.* 468. *Fl. zeyl.* 152. *Hort. ups.* 100.' Of these the last two, based on Linnaeus's own observations, must take precedence over the first for the purposes of typification. In the Flora Zeylanica and the Hortus Upsaliensis the phrase-name is identical:'CASSIA foliolis trium parium obverse ovatis, glandula subulata inter infima.' That of the Species Plantarum reads: 'CASSIA foliolis trijugatis ovatis: exterioribus majoribus; glandula subulata inter inferiora.' Although there are differences in the wording of the phrases, they are not contradictory, and the changes in the later version in the Species Plantarum may well have been due to plants in cultivation seen by Linnaeus but which have apparently not been preserved. Taking into account the facts that the Hortus Upsaliensis reference also includes another reference back to the Flora Zeylanica, and that the Species Plantarum gives '*Habitat in* India' (which as used by Linnaeus often included Ceylon), and also the expediency of typifying *Cassia tora* so as to preserve the name in De Wit's sense, I propose that the type of Flora Zeylanica, No. 152, which is a specimen in the Hermann Herbarium at the British Museum (Natural History) be chosen as the lectotype of *Cassia tora.* I have examined this and it is certainly *C. tora* in the sense of De Wit. This choice of lectotype has the additional advantage of corresponding with the type of *C. tora* suggested by Fawcett and Rendle, Fl. Jamaica, **4,** 106 (1920).

Let us now consider *Cassia obtusifolia.* De Wit (in Webbia, **11,** 255: 1955) cited as a 'neotype' (presumably lectotype was intended) the specimen in the Linnaean Herbarium numbered 528.11. This specimen has neither flowers nor pods, and is certainly neither *Cassia obtusifolia* in De Wit's sense nor *C. tora.* It has been annotated by Sir James E. Smith as 'alata junior HB'. Without feeling certain, I consider that Smith's suggestion that it is a juvenile form of *Cassia alata* L. is probably correct. The specimen has 'obtusifolia 7' written on it by Linnaeus and there is no evidence that it was not in the Linnaean Herbarium in 1753. On the ground of expediency it would be clearly undesirable for this specimen to be accepted as the lectotype of *C. obtusifolia.* Fortunately, it can be rejected for other and more solid reasons.

Linnaeus's account of *C. obtusifolia* in Sp. Pl. 377 (1753) is as follows :—

'7. CASSIA foliolis trijugatis ovatis obtusiusculis.

Cassia foetida, foliis sennae italicae. *Dill. elth.* 71. *t.* 62 *f.* 72.

Cassia minor herbacea plerumque hexaphylla, folio obtuso. *Sloan jam.* 148. *hist.* 2 *p.* 47. *t.* 180. f. 5?

Habitat in Cuba. .'

It is clear from the question-mark that Linnaeus was doubtful if the Sloane reference was rightly placed under *C. obtusifolia*. For that reason it can be neglected in typification, although in fact it relates to true *C. obtusifolia*. We are thus left with the Dillenian reference and the phrase-name. Dillenius, Hort. Eltham. Pl. Rar. 71, t. 62, fig. 72 (1732), gives a long description and a good picture of a cassia, showing stems, leaves, buds, flowers and very young pods, and there is nothing in Linnaeus's phrase-name of *C. obtusifolia* that could not have been obtained from these sources. It seems quite unreasonable to postulate that Linnaeus obtained his idea of *C. obtusifolia* mainly from the flowerless, podless specimen in his herbarium (which, had he seen flowers of it, he could not fail to have realised was quite unrelated to the plant portrayed by Dillenius); this specimen further disagrees with the Linnean diagnostic phrase in having its leaflets in up to four pairs per leaf. I therefore propose that *C. obtusifolia* L. be typified by the reference to Dillenius's Hortus Elthamensis given by Linnaeus in the Species Plantarum. Now Dillenius's drawing, although for its time a good one, is not accurate in detail—the foliar glands are not shown, and the rather short pedicels suggest *C. tora* rather than *C. obtusifolia*. The drawing is on too small a scale to show the shape of the anthers. None of these characters is made clear in the description. The plant was grown from seeds collected 'circa Havanam in Cuba insula.' Fortunately, according to Druce and Vines, the Dillenian Herbaria, 157, 162 (1907) a specimen corresponding to Dillenius's plate has been preserved, which, through the courtesy of the Sherardian Professor of Botany, has been sent on loan from Oxford University for examination.

This specimen, annotated 'Cassia foetida foliis sennae italicae. Hort. Elth.', is marked 'the original of the plate', i.e. t. 62, f. 72. The leaves, with the exception of one cauline one which has two, appear to have single glands; the pedicels of the flowers are about 1 cm. long, and a large anther with a bottleneck-like top is visible in one flower; there are no pods. The sporadic (not regular) occurrence of two glands per leaf, the anther-structure, and the locality (*C. tora* is apparently absent from the New World) all point to the plant being *C. obtusifolia* in De Wit's sense. The pedicels are rather short for the species, but the Dillenian specimen can readily be matched with flowering material in the Kew Herbarium originating from the West Indies. This specimen is then the typotype (see Stearn, Carl Linnaeus, Species Plantarum, Facsimile, **1,** 129: 1957) of *C. obtusifolia* L.

Geographical Distribution. De Wit (in Webbia **11,** 255: 1955) wrote of *C. obtusifolia*: 'Tropical America. A weed in Malaysia.' and (p. 277) of *C. tora*: a 'weed throughout the tropics, probably of S. American origin, not indigenous in Malaysia.' Both statements require correction.

C. tora is, in fact, judging from the rich material at Kew, strictly confined to the Old World, from India eastwards to Polynesia. A single specimen only from Africa, *Zimmermann* 1452 from Tanganyika, Mafia Island, may perhaps be *C. tora*, but it is not certain, and even if it is *C. tora* it may well have been

introduced. It follows that the native home of *C. tora* must be looked for in Asia or the Pacific islands.

C. obtusifolia is, on the other hand, distributed throughout the tropical regions of the world, although I have seen no material from Polynesia or Australia; indeed *C. tora* also seems not to occur in Australia. Thus in Asia both *C. obtusifolia* and *C. tora* occur, but in America and Africa (with the single possible exception mentioned above) only *C. obtusifolia*. The native home of *C. obtusifolia* is uncertain, but the possibility of it being in the Old World must be taken into account.

I am grateful to Mr. A. A. Bullock for his help and advice during this investigation.

Fragrance in the Garden.*—It is now over thirty years since F. A. Hampton produced his tentative classification of the scents of flowers and leaves. Although the present book is restricted to flowers the value of Hampton's work is freely acknowledged and the author adopts his groupings. Mr. Taylor, however, restricts himself to only six of these categories, a scheme which becomes possible in a work devoted mainly to plants found in private gardens. Even so, a number of species are cited as 'unclassified'. Flower scents, in fact, defy precise classification and indeed have always to be described in mnemonical terms. At the same time, the olfactory sense in man is notoriously inconstant and experiments have shown that individuals differ widely in their personal reactions to odours. The author's book is intended for readers in the United States but most of the trees, shrubs and herbaceous plants mentioned are well known on both sides of the Atlantic. The species are grouped together in the six major classes and there are chapters dealing with night-flowering species, house plants and the home manufacture of potpourri and other interesting items. There is a section dealing with the making of perfume from flower petals by the 'enfleurage' method. Whether many amateurs would have the temerity or courage to tackle such a complicated process is open to doubt. As an introduction to the study of flower scents this book can be thoroughly recommended. It should interest garden lovers as well as the more technically minded. The author is an experienced writer on horticultural subjects and the book, as one might expect, is well designed and prepared. The reviewer has much enjoyed reading it.

F. Ballard.

* Fragrance in the Garden, by Norman Taylor, pp. 110. D. Van Nostrand Co., Inc., Toronto, New York, London. 1953. 19/-.

Nomenclatural Notes : VIII*

A. A. Bullock

Deppea, Deppia and the lectotype species of Lycaste.

In 1828 Messrs. Conrad Loddiges and Sons received from Ferdinand Deppe, then collecting in Mexico accompanied by Christian Schiede, an orchid which flowered in their stove in 1830. They figured it in their *Botanical Cabinet* (*t.* 1612) in the same year and gave to it the name *Maxillaria deppii*. In all probability Loddiges had no intention of latinizing Deppe's name to 'Deppius' and the spelling of the epithet must be regarded as an unintentional orthographic error for '*deppei*'.

Loddiges gave no description of the plant, and the plate carries no drawings of dissections; the valid publication of the name was by Lindley in December, 1832 (Gen. Sp. Orch. *Pl.* 147), who attributed it to Loddiges and adopted the erroneous spelling.

The plant attracted the attention of Rafinesque, who quite rightly considered it to represent a genus distinct from *Maxillaria*. In his *Flora Telluriana* (1: 51. 1837) he transferred it to his genus *Deppia* with the name *D. mexicana*. The spelling error was, it will be noted, repeated in the generic name; whether the new epithet was necessary or not is arguable.

In the meantime, Chamisso and Schlechtendal had described (Linnaea 5 : 167. Jan. 1830) the rubiaceous genus *Deppea*, the name being formed in the normal manner from Deppe's name. There can be no doubt that *Deppea* Cham. et Schlecht. and *Deppia* Raf. are orthographic variants and the latter is therefore an illegitimate later homonym.

In 1843 (Bot. Reg. 29: Misc. 10) Lindley published his own arrangement of the species which had been referred to the genus *Maxillaria* (*Orchidaceae*). Among several new genera was *Lycaste*, which included *Maxillaria deppei*, the type of Rafinesque's *Deppia*.

Although *Lycaste* is thus in effect a new name for *Deppia* Raf., Lindley apparently had no knowledge of Rafinesque's work and the two names cannot be regarded as nomenclatural synonyms. Nor is it possible to make them so by the arbitrary selection of *Maxillaria deppei* as the lectotype species of *Lycaste*. In 1843 Lindley referred nine species to his new genus *Lycaste*, without at that time indicating the type, but in 1842 (Bot. Ret. 28: Misc. 85) he had already mentioned *Lycaste* and had described *L. plana*†, adding the observation, 'This plant is nearly allied to the *Maxillaria*, or *Lycaste macrophylla*, of which it has quite the habit. It differs . . . . . ' It is thus clear that Lindley had already decided that certain species of *Maxillaria* should constitute a distinct genus and that *M. macrophylla* was one of them. In his enumeration of the species in 1843 (*loc. cit.* 14), *L. macrophylla* (Poeppig)

* Continued from Kew Bull. 1958: 110. 1958.

† Although this was a new species, the description cannot be accepted as the generico-specific description of a new genus since Lindley indicated that he included at least one other species in it. The valid publication of the name *L. plana* was in 1843.—A.A.B.

Lindley was number one, followed by *L. plana* Lindley, whilst *L. deppei* (Loddiges ex Lindley) Lindley was number six.

The selection of *L. macrophylla* as lectotype of the generic name *Lycaste* seems to be reasonable and in accordance with Lindley's intention. *L. deppei* is unacceptable because it was then known to Lindley only from the Loddiges' illustration.

Peruvian Orchids.*—Although the Andean region of South America supports one of the more important of the world's orchid floras, no really complete account of the orchids of any part of this immense mountain chain has ever been published. Schlechter's lists of the orchids of four of the countries concerned, though useful in gathering together the bare records of occurrence, were not in any real manner critical, and are of little or no use to the enquirer wishing to name an orchid from the region.

The book here reviewed is therefore all the more welcome even though it deals with the orchids of only one of the Andean countries, namely, Peru. There is no doubt, however, that many Andean orchids have wide distributions along the mountain ranges; consequently Mr. Schweinfurth's book will be of great value to those interested in the orchids of the neighbouring countries of Ecuador and Bolivia, and to a lesser extent, Colombia and Venezuela. Peru, however, also includes extensive stretches of the lower country of the upper Amazon basin and the book will therefore help travellers in the interior regions of Brazil and Venezuela.

The book follows the format used previously in other parts of the well-known 'Flora of Peru', of which it is a constituent part. There are detailed keys to the genera and species, each of which is described fully but clearly, with citations of specimens seen by the author or references to other sources of information. It is unfortunate, however, that the species are arranged alphabetically, since with the keys being avowedly artificial, there are consequently no indications of the real affinities of the various species included.

The account is to be completed in four parts, the present part including, besides an introductory chapter with a map showing orchid localities, the genera in Schlechter's 1925 system of classification up to and including the genus *Lepanthes*. Mr. Schweinfurth, who was closely associated for many years with the late Professor Oakes Ames, accepts the same rather conservative treatment of genera and species, a good example being that of the genus *Spiranthes* in this part. Part I is illustrated with 45 excellent line drawings of characteristic species of many of the genera. The print is clear and the whole book pleasant to use. Mr. Schweinfurth must be warmly congratulated on the appearance of the first part of this important orchid Flora, the later parts of which will be eagerly awaited.

V. S. SUMMERHAYES.

* Orchids of Peru: Part 1, by Charles Schweinfurth. Fieldiana: Botany, Vol. 30, no. 1. Chicago Natural History Museum. 1958, Pages 260, map in text and 45 line illustrations. Price $4 (during 1958), $4.50 (later).

Nomenclatural Notes: IX*

J. B. Gillett and A. A. Bullock

The typification of Lotus schimperi

Before the modern (1905→) era of 'rules of nomenclature' the use of plant names was frequently decided on *ad hoc* principles, the main consideration being whether a name could be reasonably applied. 'Valid publication' is a comparatively recent concept and in using it, and the rules concerning typification, the conditions prevailing at the time a particular name appeared in the literature must be taken into account.

The name *Lotus schimperi* Steudel (1841) first made its appearance as a *nomen nudum*, but it was clearly typified by the citation of Schimper's specimen no. 844, collected during his first journey in southern Arabia. It would appear that Boissier (1872) accepted the name as being (in the modern sense) validly published, for he identified with the Schimper plant a specimen collected by Schweinfurth in the area covered by his flora.† He provided a description and cited the Schweinfurth specimen, but, apart from attributing the name to Steudel, there was no direct mention of Schimper's plant.

At first sight it would appear that, under the modern Rules, the holotype of *Lotus schimperi* is the Schweinfurth specimen and that Steudel's name should be deleted from the citation. As far as the Rules are concerned, it is irrelevant that Boissier's description may be more strictly applicable to one of the specimens concerned than to the other. Article 7 (note 2) refers to a holotype as being 'the one specimen or other element' used by the author of a name; it also (somewhat sketchily) covers those cases in which an author cites more than one specimen without indicating a holotype. Note 3 describes a lectotype as 'a specimen or other element selected from the original material', but does not say definitely that all the 'original material' must be cited by the author. In these circumstances it seems reasonable to assume that the 'original material' includes any material which can be shown to have been examined by the author prior to the preparation of his published description.

In these circumstances the lectotype of the name *Lotus schimperi* may be either the Schimper specimen so named by Steudel, or the Schweinfurth specimen identified with it by Boissier; the actual choice will be determined by the comparison of both specimens with the description. *Ceteris paribus*, or even in spite of some slight descriptive bias, the choice will be determined by Boissier's attribution of the name to Steudel, who saw only Schimper's specimen.

There is in fact a slight descriptive bias in favour of the Schweinfurth specimen in that Boissier describes the fruit as being six lines long. This

* Continued from Kew Bull. 1958: 254. 1958.

† Assumed on the facts of publication. There is no evidence that the identification was made by any other botanist.

applies strictly to the Schweinfurth specimen but not to the Schimper specimen which bears no ripe or nearly ripe fruit. However, in view of the taxonomic conclusions reached by one of us (J.B.G.)* it is considered better to accept the Schimper specimen as the type of *Lotus schimperi* Steudel ex Boiss.

References

Boissier, Flora Orientalis 2: 170 (1872).
Steudel, Nomenclator Botanicus 2nd. Ed. 2: 275 (1841).

* Kew Bull. 1958: ined.

Names of Bacteria.*—Bacteriologists have for long floundered between the botanical and zoological Rules in deciding upon the correct names of their organisms, but this slim, well produced volume of xxii + 186 pages should do much to resolve their difficulties. The Code incorporates nearly all the many good points in the Botanical Code, many of the better parts of the Zoological Code, and avoids most of the complications and controversial issues of the latter. A Foreword gives a brief history of the Code, particularly for the period from 1930, when the first international microbiological congress was held. There is an exhaustive contents list, showing the very clear division of the book into 4 chapters, each subdivided into sections dealing with different topics, and 4 appendices of very relevant matter, including lists of conserved and rejected names. It is noteworthy that the rejected names are given in a separate list, and are rejected absolutely, whilst conserved names appear also to be conserved absolutely. This is probably borrowed from the Zoological Code; conservation and rejection are conditional in the Botanical Code. General considerations (Chap. 1) are numbered 1 to 3 and explain the *raison d'être* and lay-out of the rest of the book. Principles form Chap. 2, numbered 1–12, and the Rules and Recommendations forming Chap. 3 are numbered in the same way as in the Botanical Code from 1–28. Chap. 4 deals with Provisions for exceptions to the Rules and for their interpretation and modification. Each principle, rule, recommendation and provision is provided with a series of 'Annotations' which include explanatory matter and examples.

The Editorial Board has done a magnificent job; minor adjustments will no doubt be required, but they will be few. I looked in vain for printing errors—since a reviewer must criticise something—but I must fall back on the use of the expression *nomina generum conservanda* which sounds awkward to one accustomed to the more usual *nomina generica conservanda.*

A. A. Bullock.

* International Code of Nomenclature of Bacteria and Viruses. Bacteriological Code. Edited by the Editorial Board of the International Committee on Bacteriological Nomenclature. Iowa State College Press, Ames, Iowa, U.S.A. $3.50. June 1958.

African Orchids: XXVI*

V. S. Summerhayes

The present contribution is devoted mainly to a revision of the species of *Angraecum* occurring on the mainland of Africa, including seven species described here for the first time. There are also descriptions of three new species belonging to other genera of Angraecoid orchids as well as a treatment of some of the species of *Eulophia* allied to *E. angolensis* (Rchb. f.) Summerh. The type specimens of all the new species are in the Kew Herbarium.

Platycoryne brevirostris *Summerh.* in Kew Bull. **1958,** 68.

Owing to a slip in labelling, the second gathering cited under the description of the above species, namely *Milne-Redhead* 3984, is recorded as coming from Northern Rhodesia. The locality mentioned is actually in the Moxico district of Angola.

Satyrium aethiopicum *Summerhayes*, nom. nov.

S. bifolium A. Rich. in Ann. Sci. Nat. sér. 2, **14,** 273, t. 18, fig. X 1–2 (1840), non (L.) Wahlenb.

Owing to the existence of *Satyrium bifolium* (L.) Wahlenb., a synonym of *Platanthera bifolia* (L.) Rich., the well-known Lesser Butterfly Orchid, the epithet *bifolium* cannot be used for the Abyssinian species described by Achille Richard. I am therefore proposing the epithet *aethiopicum* which indicates the native country of the species.

Eulophia angolensis (*Rchb. f.*) *Summerh.* in Kew Bull. **1958,** 76.

[*Lissochilus longifolius* non Benth.; Lindl. in Journ. Linn. Soc. Lond. Bot. **6,** 133 (1862)].

Cymbidium angolense Rchb. f. in Flora, **48,** 188 (1865).

Lissochilus angolensis (Rchb. f.) Rchb. f., Otia Bot. Hamburg. 64 (1878).

L. buchananii Rchb. f., l.c. (1878).

L. paludicolus Rchb. f., l.c. 63 (1878).

L. lindleyanus Rchb. f., l.c. 65 (1878).

L. platypterus Rchb. f. in Flora, **65,** 533 (1882).

Eulophia buchananii (Rchb. f.) Bolus in Journ. Linn. Soc. Lond. Bot. **25,** 185 (1889).

Lissochilus antunesii Rolfe in Bolet. Soc. Brot. **7,** 236 (1890).

L. validus Rendle in Journ. Bot. Lond. **33,** 197 (1895).

L. validus var. *minor* Rendle, l.c. 197 (1895).

L. latus Rolfe in Dyer, Fl. Trop. Afr. **7,** 79 (1897).

*Continued from K.B. 1958, 87.

Eulophia lindleyana (Rchb. f.) Schltr., Westafr. Kautsch.-Exped. 279 (1900).

Cyrtopera stolziana Kraenzl. in Engl. Bot. Jahrb. **33,** 69 (1902).

Lissochilus eylesii Rendle in Journ. Bot. Lond. **43,** 53 (1905).

L. ugandae Rolfe in Curt. Bot. Mag. **131,** t. 8044 (1905).

Eulophia stolziana (Kraenzl.) Kraenzl. ex Engl. in Engl. Pflanzenw. Afr. **2,** 444 (1908), in obs.

Lissochilus mildbraedii Kraenzl. in Engl. Bot. Jahrb. **43,** 338 (1909).

L. stolzianus (Kraenzl.) Schltr. in Engl. Bot. Jahrb. **53,** 588 (1915).

L. katentaniensis De Wild. in Bull. Jard. Bot. Brux. **6,** 91, t. XIV, fig. 6–12 (1919).

On examination of the type specimens of all the above concepts, and of over 150 other gatherings, I am convinced that they are all conspecific and represent variants of one widely ranging species which must bear the earliest epithet *angolensis*. I thought at first that it might be possible to recognise distinct subspecies in different parts of the total range of the species but on careful comparison I find that this is not possible. There is a certain amount of segregation of characters in various areas but in no case do these define distinct entities which can be recognised at all clearly from others.

Two types of variation in the species have been mainly responsible for the large number of species which have been proposed. In the first place is variation in the relative length and breadth of the petals and the relation between the breadth of the petals and that of the sepals. Secondly is the considerable range of colour which may produce marked differences in the appearance of the species in different areas or in different populations. These two types of variation are combined in different ways to produce regional facies which, however, are never really sharply defined nor universal in the areas concerned.

For instance plants in the most southerly parts of the range, e.g. South Africa, S. Rhodesia, etc., have almost entirely yellow flowers with rather broad petals in which the ratio of length to breadth is usually under 2. In the northern regions, particularly in West Africa, the petals are also rather broad and considerably broader than the sepals; the latter are usually red or brown in colour, the petals and labellum being yellow. In Angola, Northern Rhodesia and the southern Belgian Congo forms predominate in which the petals are more than twice as long as broad, while in both the petals and labellum there is a strong admixture of brown, pink or purple colour. This group includes the type of the species. In north-eastern districts the inflorescences are more densely flowered, but the coloration is similar to that in West African plants; on the other hand the sepals are often broader than in these latter. In all these areas, however, it is not difficult to find plants which do not agree in the above features with the generality, while the different types can be seen to merge gradually into one another when many gatherings are examined.

The general arrangement of the calli and keels on the labellum is a very constant one though there is considerable variation in detail. There are three low keels extending from the interior of the spur forwards for some distance to where the labellum bends downwards, the two lateral ones at

that point being taller and much more swollen than the middle one, resembling, though in a less pronounced degree, those in *E. cristata* (Sw.) Steud. and *E. livingstoniana* (Rchb. f.) Schltr. In front of these swellings all three keels are very low or sometimes scarcely recognisable for same distance, when at the base of the middle or front lobe they rise again to form three usually tall wall-like lamellae. These lamellae are often very flexuous and crenulate along their tops, sometimes being almost toothed like the comb of a cock, but they may rarely be low and not very well developed. In South African plants, and also in some individuals from other areas, there may be an additional lamella, or portion of one, on each side of the three central ones, while in other plants the central lamella may be divided longitudinally in the upper portion so as to appear double from above. All intermediates between the above variations can be found but the basic plan remains essentially the same and is quite different from that in *E. caricifolia* (Rchb. f.) Summerh., *E. coeloglossa* Schltr., and other species belonging to this alliance.

As here understood the species is distributed throughout Tropical Africa and occurs also in the Transvaal, Natal and the eastern part of the Cape Province.

Eulophia antennisepala (*Rchb. f.*) *Schltr.*, Westafr. Kautsch.-Exped. 279 (1900).

Lissochilus antennisepalus Rchb. f. in Flora, **65,** 533 (1882).

This species, of which I have seen the type specimen in the Reichenbach herbarium at Vienna, is allied to *E. caricifolia* (Rchb. f.) Summerh. It has much the same colour scheme and the general appearance of the flowers is the same. It is, however, a shorter and more slender plant with very narrow leaves and a few-flowered inflorescence. The three crests on the base of the front lobe of the labellum are composed of numerous hair-like processes or fimbriae and are clearly defined from the rest of the disc. In *E. caricifolia* there are usually more than three crests (sometimes as many as 9) those on the outside tending to be lower and to resemble thickened veins, the whole system not being so well defined or so tall as in *E. antennisepala.* I have now also seen excellent material of this latter species from the Mwinilunga district of Northern Rhodesia collected by Mr. Milne-Redhead.

Eulophia malangana (*Rchb. f.*) *Summerh.* in Kew Bull. **1956,** 232 (1956).

Lissochilus malanganus Rchb. f. in Flora, **65,** 533 (1882).

Eulophia warburgii Schltr. in Warb., Kun.-Samb. Exped. 214 (1903).

E. rigidifolia Kraenzl. in Engl. Bot. Jahrb. **51,** 387 (1914).

Examination of holotype or isotype specimens of all the above concepts makes it clear that they are conspecific. There is a certain amount of variation in the shape of the labellum, especially the relative sizes of the basal and distal portions on either side of the constrictions. In the type specimen of *E. malangana* these parts are more or less equal in size whereas in *E. warburgii* and *E. rigidifolia* the distal (or apical) part is rather larger and a little wider than the basal portion. When many gatherings are examined these distinctions break down. In general features the labellum is quite characteristic, with its numerous slightly thickened veins but no distinct calli, and is quite different from the labellum in other species of this affinity.

As here understood the species occurs in Angola, the Belgian Congo, and Northern Rhodesia.

Angraecum Bory

The genus *Angraecum* has caused considerable difficulty to taxonomists in the past because of the extremely variable circumscription given to it by different botanists. As a result, however, of Schlechter's researches on the whole group of African Sarcanthoid orchids, the genus has been much reduced in size, many aberrant forms having been separated off as distinct, and often easily recognisable genera. *Angraecum* is now restricted to species in which the column apex, and the rostellum, is divided deeply into two broad rounded or more or less quadrate lobes, rarely with a central tooth after removal of the viscidia. There may be one viscidium or two separate viscidia, in the former case the viscidium being held between the two rostellum lobes. When there are two viscidia they are placed one on each side of the central cleft. There is, however, no sharp distinction between these two types and sometimes the two viscidia will come away together, being adherent along their adjacent margins. They may often be separated from one another without difficulty. The genus as now curtailed forms a reasonably natural group, the species of which are not difficult to recognise at sight.

Even after the removal of the various genera already referred to the genus *Angraecum* is still a comparatively large one. Perrier de la Bâthie (Fl. Madag. Orch. **2,** 202–321: 1941) enumerates 114 species from Madagascar, while another 40 species or so occur in other parts of the Mascarene Islands and 1 in Ceylon. With the 42 species enumerated below from the African mainland the total number in the genus is about 200, and there is reason for thinking that a number of species still remains to be discovered or described.

In his first treatment of the genus Schlechter (Beih. Bot. Centralbl. **36,** ii. 155–176: 1918) distributed the species known to him into six sections, these including the mainland species as well as those from the Mascarene Islands in the broad sense. In 1925, when dealing with the Madagascan collections made by Perrier de la Bâthie (Fedde, Repert. Beih. **33,** 306–360) he put forward a more detailed classification, recognising 13 sections, and this classification was adopted by Perrier de la Bâthie with slight modifications. Although Schlechter makes references to a number of mainland species when discussing his new arrangement of the genus he does not by any means account for all of them. As he discarded two of his old sections and altered the circumscription of some of the others it is not always easy to determine where the mainland species should be placed in his new system.

In earlier papers (Kew Bull. **1956,** 232–234; **1958,** 84–86) I have re-established Schlechter's section *Conchoglossum*, which was omitted from his 1925 classification, to include a number of mainland and Mascarene species. I am rather of the opinion now, having examined a greater range of forms, that the species with 3–4-flowered inflorescences (e.g. *A. multinominatum* Rendle) are perhaps better retained in what may still be called sect. *Hildebrandtiangraecum*. It is probable, however, that it will prove more satisfactory eventually to divide this section so as to separate out the different groups of species included in it by Schlechter and Perrier de la Bâthie. I have also had to create a new section to contain several species which do not fall satisfactorily into any of Schlechter's sections. Most of the mainland species,

however, can be placed in one or other of his sections, especially if these are interpreted as modified by Perrier. It is clear, however, that much more work remains to be done on *Angraecum* before a really satisfactory sectional classification can be devised; many of the species which have been described are very poorly known and I have not seen material of most of these.

The following is a list of all the mainland species arranged according to their sections, so far as these can be accurately ascertained. I have not seen several of the species, the types of which have been destroyed, and I cannot be certain of their placing. It is to be hoped that they will be rediscovered either in the original localities or elsewhere. I have also seen material, which may represent distinct species not enumerated here, but which is not adequate for description.

Sect. I. **Pectinaria** (Cordem.) Schltr. in Beih. Bot. Centralbl. **36,** ii, 157 (1918).

The plants forming this section are very distinct in appearance on account of the numerous and often fleshy leaves which in several species are flattened in a vertical plane. Cordemoy treated the group as a distinct genus but it seems best considered as a section. The flowers are usually almost, if not quite, sessile and generally solitary. In general floral structure, including the column, the species agree well with those in other sections of *Angraecum.* The pollinia, however, are often sessile on the viscidium or viscidia, as the case may be, without any distinct stipes; in some species they may be shortly stipitate though these stipites are rarely well developed.

1. **Angraecum distichum** *Lindl.* in Edw. Bot. Reg. **21,** t. 1781 (1836); Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936); Dandy in Exell, Vasc. Pl. S. Tomé, 331 (1944).

Limodorum imbricatum Sw. in Schrad. Neues Journ. **1,** 87 (1805).

Aëranthus distichus (Lindl.) Rchb. f. in Walp. Ann. **6,** 901 (1864).

Mystacidium distichum (Lindl.) Pfitz. in Engl. & Prantl, Nat. Pflanzenf. ii. **6,** 216 (1889); Rolfe in Dyer, Fl. Trop. Afr. **7,** 175 (1897).

Epidorchis disticha (Lindl.) Kuntze, Rev. Gen. Pl. 660 (1891).

Macroplectrum distichum (Lindl.) Finet in Mém. Soc. Bot. France, **9,** 22 (1907).

Angraecum imbricatum (Sw.) Schltr. in Beih. Bot. Centralbl. **36,** ii. 158 (1918), non Lindl.

Distrib.: From French Guinea eastwards to Uganda and southwards through Gabon and Belgian Congo to Angola.

The earliest epithet *imbricatum* cannot be used for this species, as is done by Schlechter in his monograph of the Angraecoids, owing to the existence of *Angraecum imbricatum* Lindl., a synonym of *Calyptrochilum emarginatum* (Sw.) Schltr.

var. **grandifolium** (*De Wild.*) *Summerhayes,* comb. nov.

Mystacidium distichum var. *grandifolium* De Wild. in Ann. Mus. Congo, sér. V, **2,** 240 (1907).

In this variety, of which I have seen specimens from Southern Nigeria, Fernando Po. Principe, S. Tomé, the French Cameroons and the Belgian Congo, the leaves are much larger than in the type, being from 12–18 mm. in length. The flowers are very similar in structure with the labellum more acute at the apex than in the type. It may be necessary to treat this variety as a distinct species when a thorough examination of the floral characters can be made from more complete material.

2. **A. podochiloides** *Schltr.* in Engl. Bot. Jahrb. **38,** 162 (1906); et in Beih. Bot. Centralbl. **36,** ii, 159 (1918); Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936).

Monixus aporum Finet in Mém. Soc. Bot. France, **9,** 19, t. III, fig. 9–12 (1907).

Distrib.: Liberia, Ivory Coast, ?Ghana, Nigeria, British Cameroons, Belgian Congo.

Very similar in appearance to some species belonging to sect. *Aporum* of *Dendrobium*, and also to the genera *Podochilus* and *Appendicula*.

3. **A. pungens** *Schltr.* in Engl. Bot. Jahrb. **38,** 163 (1906) et in Beih. Bot. Centralbl. **36,** ii. 159 (1918); Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936).

Distrib.: Nigeria, British and French Cameroons, Belgian Congo.

The lanceolate pungent-pointed leaves have a false articulation just below the apex similar to that in some species of *Sarcanthus*.

4. **A. arthrophyllum** (*Kraenzl.*) *Schltr.* in Fedde, Repert. Spec. Nov. Beih. **33,** 312 (1925), in obs.

Mystacidium arthrophyllum Kraenzl. in Ann. Nat. Hofmus. Wien, **30,** 64 (1916).

Distrib.: Cameroons.

This is very similar to *A. pungens* Schltr., judging by the description, and may merely be a small-flowered individual of that species.

5. **A. doratophyllum** *Summerh.* in Kew Bull. **1937,** 465; Dandy in Exell, Vasc. Pl. S. Tomé, 331, fig. 26 (1944).

Distrib.: S. Tomé.

Very like *A. pungens* Schltr. vegetatively but differing in the larger flowers, much wider spur and strap-shaped stipes to the pollinia.

6. **A. gabonense** *Summerh.* in Kew Bull. **1953,** 587 (1954).

Distrib.: Gabon & Belgian Congo.

This species also resembles *A. pungens* Schltr. but is of a more delicate build with distinctly smaller leaves. The flowers are also smaller while the spur is relatively short and clavate. The Belgian Congo specimens have slightly smaller flowers than in the original Gabon material while the stems do not root quite so freely, but in all essential features the plants from the two areas agree.

7. **A. subulatum** *Lindl.* in Hook. Comp. Bot. Mag. **2,** 206 (1837); Schltr. in Beih. Bot. Centralbl. **36,** ii. 159 (1918); Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936).

Listrostachys subulata (Lindl.) Rchb. f. in Walp. Ann. **6,** 909 (1864); Rolfe in Dyer, Fl. Trop. Afr. **7,** 168 (1897).

Epidorchis subulata (Lindl.) Kuntze, Rev. Gen. Pl. 660 (1891).

Angraecum canaliculatum De Wild. in Bull. Jard. Bot. Brux. **5,** 183 (1916).

Distrib.: From Sierra Leone eastwards to the Belgian Congo.

De Wildeman states that his *A. canaliculatum* is allied to *A. subulatum* but he does not mention how it differs from that species. Judging from the specific epithet he adopts it seems possible that he thought it differed in the canaliculate leaves, those in *A. subulatum* having been always described as subulate without qualification. Actually, however, the leaves in *A. subulatum*, though subulate in general form, always have a narrow groove along the upper surface and may therefore properly be termed canaliculate. The leaves in Congo specimens are on the whole longer and narrower than those of plants from Sierra Leone and other western areas but even there one can find considerable variations in this respect. The way in which the solid fleshy leaves wrinkle on drying also differs from specimen to specimen or even on different leaves of the same specimen; the transverse wrinkling mentioned by De Wildeman can be paralleled in other specimens from farther west though it does not always occur. In some leaves the wrinkling is always longitudinal, but in others one finds a combination of longitudinal and transverse wrinkles.

Sect. II. **Micrangraecum** *Schltr.* in Fedde, Repert. Spec. Nov. Beih. **33,** 308, 310, 331 (1925).

Schlechter divided into two sections the species with stems scarcely elongated and bearing rather thin-textured flowers in several or many-flowered inflorescences. In the sect. *Micrangraecum* the flowers are small, white in colour and are borne in more or less secund many-flowered racemes. The stems grow slowly, the internodes are very short and consequently the leaves usually appear to form a tuft.

8. **A. chamaeanthus** *Schltr.* in Engl. Bot. Jahrb. **53,** 604 (1915); Mansf. in Fedde, Repert. Spec. Nov. Beih. **68,** t. 89, fig. 347 (1932).

Distrib.: Tanganyika, Southern Rhodesia.

The leaves are lanceolate or narrowly lanceolate, up to 2·5 cm. long. With its bunch of aerial roots and inconspicuous leaves the species is reminiscent of some species of *Microcoelia*.

9. **A. pusillum** *Lindl.* in Hook. Comp. Bot. Mag. **2,** 205 (1837); Bolus, Ic. Orch. Austr.-Afr. **1,** t. 54 (1896); Rolfe in Dyer, Fl. Cap. **5,** iii. 70 (1912); Schltr. in Beih. Bot. Centralbl. **36,** ii. 164 (1918).

Angorchis pusilla (Lindl.) Kuntze, Rev. Gen. Pl. 651 (1891).

Distrib.: Cape Province, Natal.

Differs from *A. chamaeanthus* in the longer and narrower leaves and much longer slender inflorescences. The spur is also narrower than in Schlechter's species, but the flowers themselves are about the same size.

10. **A. minus** *Summerhayes*, sp. nov.; affine *A. pusillo* Lindl., a quo planta minore, floribus ut videtur textura carnosioribus, labello ovoideo cymbiforme apice breviter cucullato, calcari breviore satis differt.

Herba epiphyta, parva, usque at 5 cm. alta, omnino glaberrima; caulis erectus, brevissimus, usque ad 1 cm. longus, dense foliatus, radices flexuosas carnosas ± applanatas griseas vel albidas emittens. *Folia* disticha, erecto-patentia vel ± recurvata, linearia vel lineari-ligulata, apice acuta vel ± inaequaliter bilobulata, 1–4 cm. longa, 1–4 mm. lata, textura tenuiter coriacea, vagina quam lamina multo latiore longitudinaliter costulata. *Inflorescentiae* axillares, erectae vel suberectae, gracillimae, sublaxe multiflorae, usque ad 5 cm. longae; pedunculus filiformis, usque ad 1·5 cm. longus, vaginis pluribus arctis instructus; rhachis filiformis; bracteae ovatae, acutae, acuminatae vel biapiculatae, 1·5–3 mm. longae, scariosae, ovario pedicellato saepius longiores. *Flores* secundi, patentes, albi vel viridi-albi; pedicellus cum ovario circiter 2 mm. longus. *Sepalum* intermedium ovatum vel elliptico-ovatum, obtusum, rotundatum vel apiculatum, 1–1·6 mm. longum, 0·7–1·2 mm. latum; sepala lateralia oblique oblonga vel oblongo-elliptica, apice acuta vel subacuta, 1·3–1·75 mm. longa, 0·5–1·1 mm. lata; omnia sepala uninervia, rarius binervia. *Petala* leviter oblique lanceolato-ovata vel lanceolato-elliptica, apice acuta vel subacuta, 1·2–1·4 mm. longa, 0·65–0·9 mm. lata, uninervia; omnia tepala saccis cristalliferis distinctis instructa. *Labellum* cymbiforme, late ovatum, apice subacutum, breviter cucullatum, 1·4–1·7 mm. longum, 1·6–2 mm. latum, plurinervium; calcar leviter recurvatum, conico-saccatum, 0·45–0·6 mm. longum, basi circiter 0·5 mm. diametro. *Columna* brevis, crassa, apice truncata, 0·25–0·5 mm. longa; anthera hemisphaerica, antice truncata, polliniis ovoideis 0·2 mm. longis, stipite et viscidio non visis verosilimiter minutis; rostellum profunde excisum, lobis rotundatis. *Capsulae* elliptsoideae, 3–4 mm. longae.

Tanganyika Territory. East Usambara Mts., Amani, Bomole, 1050 m. alt., epiphytic on rain-forest trees and exotic conifers, Aug. 1942, *Moreau* 122.

Northern Rhodesia. Mwinilunga Distr., just S. of Matonchi Farm, in *Brachystegia* woodland, on mossy branches of trees, Feb. 1938, *Milne-Redhead* 4626.

Southern Rhodesia. Vumba Distr., Norseland, 1500 m. alt., epiphytic on *Brachystegia*, March 1949, *Wild* 2815 (S. Rhod. Gov. Herb. No. 22732); Umtali Distr., Himalaya Range, Engwa, 2000 m. alt., March 1954, *Wild* 4541 (S. Rhod. Gov. Herb. No. 46220) (type).

This very neat-looking little species is evidently widespread in eastern Africa though its small size has caused it to be overlooked in the past. Further exploration will no doubt reveal its presence in other localities.

The species is evidently near *A. pusillum* Lindl. and *A. chamaeanthus* Schltr. from which it may be distinguished by the fleshier flowers, the deeply cymbiform labellum and the much shorter spur.

11. **A. burchellii** *Rchb. f.* in Flora, **50,** 117 (1867); Rolfe in Dyer, Fl. Cap. **5,** iii. 71 (1912); Schltr. in Beih. Bot. Centralbl. **36,** ii. 160 (1918).

Epidorchis burchellii (Rchb. f.) Kuntze, Rev. Gen. Pl. 660 (1891).

Distrib.: Eastern Cape Province.

Rather larger than the other three mainland species of sect. *Micrangraecum* with larger leaves (up to 16 cm. long) and considerably longer inflorescences. In floral structure it agrees very well with other species of the section, the flowers being secund and small for the size of the plant. The labellum is boat-shaped with a rather short cylindrical spur.

Sect. III. **Boryangraecum** *Schltr.* in Fedde, Repert. Spec. Nov. Beih. **33,** 308, 310, 334 (1925).

The plants in this section possess the short stems, thin-textured flowers and many-flowered inflorescences of sect. *Micrangraecum,* but the flowers are not secund on the rhachis, are greenish or yellowish in colour, not white, and are usually considerably larger than in that section.

12. **A. dives** *Rolfe* in Dyer, Fl. Trop. Afr. **7,** 142 (1897).

Distrib.: Kenya, Tanganyika, Zanzibar.

This species occurs in a narrow strip of country along the coast from Malindi in Kenya southwards to the region of Dar-es-Salaam. It resembles *A. burchellii* in general growth but is stouter in all its parts, particularly the inflorescences. Also the much larger flowers are not secund and are greenish or greenish-yellow in colour. *A. dives* also resembles the Mascarene *A. caulescens* Thou., but differs in the stouter inflorescences, the more herbaceous bracts and the straight pedicel and ovary, this latter being twisted around the spur in *A. caulescens.*

13. **A. sacciferum** *Lindl.* in Hook. Comp. Bot. Mag. **2,** 205 (1837); Bolus, Ic. Orch. Austr.-Afr. **1,** t. 10 (1893); Rolfe in Dyer, Fl. Cap. **5,** iii. 70 (1912); Schltr. in Beih. Bot. Centralbl. **36,** ii. 165 (1918).

Angorchis saccifera (Lindl.) Kuntze, Rev. Gen. Pl. 651 (1891).

Epidorchis saccifera (Lindl.) Kuntze, Rev. Gen. Pl. 660 (1891).

Angraecum parcum Schltr. in Engl. Bot. Jahrb. **53,** 604 (1915); Mansf. in Fedde, Repert. Spec. Nov. Beih. **68,** t. 91, fig. 363 (1932).

Distrib.: British Cameroons, Belgian Congo, Uganda, Kenya Colony, Tanganyika Territory, Southern Rhodesia, Mozambique, Transvaal, Natal, Cape Province as far west as Knysna.

I have written out the above distribution in full because it represents on the whole a number of isolated gatherings situated at long distances from one another. In many of the countries mentioned the plant has been collected only once or twice but it seems probable that it occurs in many other places. The small green flowers and tuft of rather narrow leaves make it quite inconspicuous.

The species is characterised by the dwarf habit, narrow leaves and slender inflorescences with up to 6 small green flowers. The spur is short and thick and the ovary is curved and twisted around it so as to bring the labellum to the lower front of the flower.

14. **A. teres** *Summerhayes,* sp. nov.; affine *A. xylopodi* Rchb. f., a quo cauli minus robusto, foliis multo longioribus haud supra canaliculatis, petalis sepalis aequilongis, labelli calcari pedicellum cum ovarium excedente satis distinguendum.

Herba epiphytica, fere acaulis, usque ad 15 cm. alta, omnino glaberrima. *Caulis* brevissimus, erectus, usque ad 1 cm. longus, basi radices flexuosas pauciramosas brunneas vel griseas ± applanatas emittens, inferne vaginis foliorum delapsorum vestitus, superne usque ad 5-foliatus, vaginis inclusis circiter 5 mm. diametro. *Folia* ± recurvata, teretia, rigida, apice pungentia, usque ad 13 cm. longa et 1–2·5 mm. diametro, sordide viridia, lamina a vagina valde oblique articulata; vagina quam lamina latior, longitudinaliter costata. *Inflorescentiae* erecto-patentes, graciles, usque ad 17 cm. longae, laxe usque ad 8-florae; pedunculus 2–8 cm. longus, gracillimus, vaginis pluribus arctis dissitis instructus; rhachis ± fractiflexa, gracillima, usque ad 10 cm. longa; bracteae erecto-patentes, ovatae vel lanceolatae, acutae vel breviter acuminatae, 1·5–3·5 mm. longae, pedicello cum ovario multo breviores, scariosae. *Flores* suberecti vel fere patentes, virides cum tepalorum apicibus ochraceis, noctu suaveolentes; pedicellus cum ovario fere filiformis, circiter 1 cm. longus. *Sepalum* intermedium lanceolatum, acutum, 7·5–8 mm. longum, 3·5–4 mm. latum, marginibus recurvatis; sepala lateralia oblique et leviter curvatim lanceolata, acuta, 7–7·5 mm. longa, 2·5–3 mm. lata; omnia sepala recurvata, subquinquenervia. *Petala* minus recurvata, oblique anguste lanceolata, fere acuminata, circiter 8·5 mm. longa, 1·5–2 mm. lata, subquinquenervia. *Labellum* valde concavum, ovatum, apice acutum, 5·5 mm. longum, 3·5 mm. latum; calcar ± rectum, cylindricum, apice leviter clavatim inflatum obtusum, circiter 2 cm. longum, apice ochraceum. *Columna* brevis, crassa, apice truncata, 0·8 mm. longa; anthera bilobatim hemisphaerica, antice leviter emarginata, polliniis sphaerico-ovoideis 0·4 mm. longis sessilibus, viscidiis duobus distinctis utroque obtusis 0·6 mm. longis; rostellum profunde excisum, trifidum, lobis lateralibus latis quadratis, lobo intermedio aciculari lateralibus aequilongo. *Capsulae* ellipsoideae vel ± pyriformes, circiter 8 mm. longae et 5 mm. diametro, obtuse 6-costatae.

Tanganyika Territory. East Usambara Mts., Amani, 600 m. alt., epiphytic on *Cedrela odorata*, March 1941, *Moreau* 49 (type); said also to occur on indigenous trees near the sea.

This interesting species, which is quite unlike any other mainland species so far recorded, is clearly related to the Comoro Islands species *A. xylopus* Rchb. f. It differs from that species by the characters given in the diagnosis. Characteristic features are the long terete leaves arising in a tuft from the very short stem, and the slender inflorescences with rather widely spaced flowers. The pollinia appear to be sessile on the strap-shaped viscidia which are held between the needle-like central lobe of the rostellum and the much broader side-lobes. In his description of *A. xylopus* Finet (Mém. Soc. Bot. Fr. **9**, 23, t. III, fig. 16–19: 1907) interprets the corresponding structures as stipites and states that there is no viscidium, but the illustrations show that they are comparable with those in *A. teres* and therefore the viscidia.

Sect. IV. **Hildebrandtiangraecum** *Schltr.* in Fedde, Repert. Spec. Nov. Beih. **33**, 308, 310, 342 (1925).

This section is very close to sect. *Boryangraecum*, differing in the elongated stems. It is sometimes difficult to decide on the section to which some species should be referred and Schlechter includes in this section *A. sacciferum* Lindl. and *A. burchellii* Lindl. which I think are better placed in other

sections (see above). The leaves in the mainland species of this section are on the whole considerably broader than in sect. *Boryangraecum* while the flowers are larger.

15. **A. claessensii** *De Wild.* in Bull. Jard. Bot. Brux. **5,** 184 (1915).
Distrib.: Belgian Congo.

This species may be recognised by the broad leaves, the long laxly flowered inflorescences and the shape of the labellum. This is almost trilobed with the apparent side lobes broad and rounded and the centre running out into a long recurved acumen; the spur is short with a much swollen apex.

16. **A. firthii** *Summerhayes*, sp. nov.; ab *A. claessensii* De Wild. foliis angustioribus, floribus majoribus, labelli calcari plus duplo longiore minus inflato facile distinguitur.

Herba epiphytica, usque ad 20 cm. longa, omnino glaberrima. *Caulis* elongatus, ± flexuosus, usque ad 15 cm. longus, inferne radices flexuosas ramosas griseas instructus, vaginis foliorum delapsorum vestitus, superne sublaxe foliatus, ± anceps, 3–5 mm. diametro. *Folia* disticha, ± patentia; vagina anceps, 1–1·5 cm. longa, siccitate longitudinaliter costulata; lamina oblonga, ligulato-oblonga vel oblanceolato-oblonga, apice inaequaliter rotundate bilobulata, lobulo longiore usque ad 8 mm. longo ± incurvato, lobulo breviore brevissimo vel fere nullo, 5–11 cm. longa, 1–3 cm. lata, tenuiter coriacea, saturate viridis, costa subtus prominula. *Inflorescentiae* suberectae vel erecto-patentes, foliis saepius aequilongae vel longiores, usque ad 12 cm. longae, dimidio superiore laxe 3–7-florae; pedunculus gracilis, usque ad 6 cm. longus, basi vaginis pluribus imbricatis medio interdum vagina singula ovata instructus; rhachis ± fractiflexa, gracilis; bracteae patentes, ovatae, subacutae, 2–4 mm. longae, ovario pedicellato multo breviores. *Flores* patentes vel erecto-patentes, flavo-virides vel aurantiaco-cinnamomei; pedicellus cum ovario fere rectus, gracilis, 10–15 mm. longus. *Sepalum* intermedium lanceolatum, ± longe acuminatum, 14–19 mm. longum, 3–4 mm. latum; sepala lateralia oblique anguste lanceolata, acutissima vel acuminata, 14–18 mm. longa, 2·5–3 mm. lata; omnia sepala septem- vel subseptemnervia. *Petala* oblique vel curvatim anguste lanceolata, acuminata, 11–15 mm. longa, 1·8–2·5 mm. lata, quinquenervia; omnia tepala ± recurvata. *Labellum* valde concavum, fere orbiculare, apice ± emarginatum medio in acumen elongatum laminam aequans recurvatum decurrens, totum 11–13 mm. longum, 4·5–6·5 mm. latum, multinervosum, medio carina humili longitudinali instructum; calcar ex ore lato sensim angustatum, triente apicali clavato-inflatum, dimidio apicali leviter decurvatum, 12–16 mm. longum. *Columna* brevis, crassa, 1–2 mm. longa, apice truncata; anthera late hemisphaerica, antice leviter emarginata, polliniis ovoideis vel fere pyriformibus circiter 1 mm. longis, stipitibus ligulatis apice rotundatis 0·75 mm. longis, viscidiis primo inter se adhaerentibus demum separatis linearibus utroque angustatis 1·3–1·5 mm. longis; rostellum profunde bifidum, lobis ± quadratis truncatis.

French Cameroons. Kongola, 175 km. W. of Buar, 750–800 m. alt., in gallery forest, Apr. 1914, *Mildbraed* 9005; Dendeng, 100 km. S. of Buar, 700–750 m. alt., Apr. 1914, *Mildbraed* 8889.

Uganda. Bunyoro, Budongo, June 1937, *Eggeling* 3358.

Kenya Colony. Kakamega, 1440 m. alt., June 1938, *Firth* 1; near Fort Ternan, June 1952, *Firth* (type).

This species is clearly allied to *A. claessensii* De Wild. but differs from it by the characters given in the diagnosis. The labellum in particular is very similar, the basal part being very concave and orbicular in general shape with the sides projecting to form broad rounded side lobes; from the centre of the front margin arises a long narrow recurved acumen about the same length as the lower part of the lamina. The two pollinaria tend to come away together as the narrow viscidia adhere by their adjacent margins but they may be separated quite easily. There is no narrow central rostellum lobe as in some species of the genus.

17. **A. affine** *Schltr.* in Engl. Bot. Jahrb. **38,** 19 (1905).

Distrib.: French Congo.

The type specimen of this species was unfortunately destroyed with the Berlin Herbarium. In vegetative features it seems similar to *A. firthii* Summerh. but the inflorescences are much shorter than the leaves and the labellum is said to be ovate and subacute which is quite different from that in *A. firthii* and *A. claessensii* De Wild. Schlechter also states that though there are 2 separate stipites there is only a single obovate viscidium. It is, however, possible that there were really two viscidia which adhered closely, as in *A. firthii* and other *Angraecum* species. The identity of the species can be established only by further collecting in the Ngoko district of the French Congo; it is said by Schlechter to be allied to *A. multinomination* Rendle.

18. **A. multinominatum** *Rendle* in Cat. Talb. Nig. Pl. 107 (1913); Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 454 (1936).

Listrostachys clavata Rendle in Journ. Bot. Lond. **33,** 251 (1895).

Mystacidium clavatum (Rendle) Rolfe in Dyer, Fl. Trop. Afr. **7,** 172 (1897).

Angraecum clavatum (Rendle) Schltr., Westafr. Kautsch.-Exped. 283 (1900), et in Beih. Bot. Centralbl. **36,** ii. 167 (1918), non Rolfe.

Macroplectrum clavatum (Rendle) Finet in Mém. Soc. Bot. France, **9,** 26 (1907).

Distrib.: French Guinea, Sierra Leone, Ghana, S. Nigeria and Gabon.

Characterised by the short but rather broad leaves, the short few-flowered inflorescences, the broadly lanceolate tepals, the ovate acute labellum and spur 11–13 mm. long swollen in the distal half.

19. **A. pyriforme** *Summerh.* in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936), in clavi, et in Kew Bull. **1936,** 230.

Distrib.: S. Nigeria.

This species is related to *A. multinominatum* Rendle, but differs in the less unequal bilobing of the leaf apices and in the shape of the spur which is swollen into an ellipsoid sac at the end.

20. **A. angustum** (*Rolfe*) *Summerh.* in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936).

Mystacidium angustum Rolfe in Dyer, Fl. Trop. Afr. **7,** 570 (1898).

Distrib.: S. Nigeria.

Characterised by the very acute narrow perianth segments and the sudden widening of the labellum in the lower centre to form an almost cordate long-acuminate limb. The spur is swollen in the lower part, narrowed rather abruptly in the centre and then widened to form a clavate apical half.

21. **A. anocentrum** *Schltr.* in Engl. Bot. Jahrb. **26,** 342 (1899).

Distrib.: Mozambique.

This is another species of which the type specimen has been destroyed. I have not seen any mainland material which agrees with the original description. The species seems nearest to *A. caulescens* Thou., a Mascarene species, but I fail to see any relationship to *A. sacciferum* Lindl. as suggested by Schlechter. The branched inflorescence distinguishes it from all other mainland species.

Sect. V. **Lepervenchea** (*Cordem.*) *Schltr.* in Beih. Bot. Centralbl. **36,** ii. 157, 160–166 (1918), partim, sphalm. *Lepervanchea*, et in Fedde, Repert. Spec. Nov. Beih. **33,** 308, 310, 349 (1925).

Lepervenchea Cordem. Rev. Génér. Bot. **11,** 426 (1899), pro gen.

The name *Lepervenchea* was first proposed by Cordemoy for a species from Réunion. When Schlechter adopted the name for a section of *Angraecum* he included in the section many species which later he separated off into distinct sections. In his latest classification (see reference above) he restricted the section to species with rather long, branched, closely leafy stems and with short inflorescences in which the bracts nearly equal or even exceed the pedicels in length. The section is strongly represented in Réunion while there are also a number of species in Madagascar.

22. **A. humile** *Summerhayes*, sp. nov.; species distincta, foliis valde carnosis supra late canaliculatis, inflorescentiis brevibus foliis multo brevioribus usque ad 4-floris, floribus parvis, labelli calcari lamina aequilongo vel breviore inflato, viscidio communi.

Herba epiphytica, humilis, omnino glaberrima. *Caulis* prostratus vel ± pendens, usque ad 15 cm. longus, pauciramosus, inferne radices flexuosas viridi-griseas graciles emittens, superne dense foliatus, circiter 1·5 mm. diametro. *Folia* disticha, ± patentia, oblongo-lanceolata, linearia vel lineari-ligulata, valde carnosa, ± lateraliter compressa, sectio ± triangularia, subtus rotundata, supra late canaliculata vel excavata, 1–2 cm. longa, 1·5–3 mm. horizontaliter lata, 1·5–4 mm. verticaliter lata, apice acuta, rugulosa, pallide vel saturate viridia. *Inflorescentiae* axillares, usque ad 7 mm. longae, usque ad 4-florae; pedunculus brevis, vaginis paucis vestitus; bracteae fere imbricatae, ovatae, subacutae, pedicellis cum ovariis fere aequilongis. *Flores* erecto-patentes, albi vel viridi-albi; pedicellus cum ovario ± arcuatus, 3–4 mm. longus. *Sepalum* intermedium oblongum vel elliptico-oblongum, apice subacutum vel rotundatum, 1·4–1·8 mm. longum, 0·75 mm. latum; sepala lateralia oblique et leviter curvatim oblonga, apice obtusa, 1·6–2·1 mm. longa, 0·75 mm. lata. *Petala* oblonga vel elliptico-

oblonga, apice obtusa vel breviter apiculata, 1·3–2 mm. longa, circiter 0·75 mm. lata; omnia tepala ± conniventia, uninervia. *Labellum* ovatum vel lanceolato-ovatum, valde concavum, apice subacutum, circiter 1·7 mm. longum et 1·4 mm. latum, trinervium; calcar ex ore lato satis constrictum, duobus trientibus apicalibus clavato-inflatum, apice obtusissimum vel fere emarginatum, 1·4–1·8 mm. longum, 0·7–1 mm. diametro. *Columna* brevis, crassa, apice truncata, 0·35 mm. longa; anthera leviter bilobatim hemisphaerica, antice haud producta, polliniis ovoideis 0·25 mm. longis, stipitibus minutis, viscidio uno communi quadrato postice angustato 0·27–0·3 mm. longo; rostellum profunde bifidum, lobis latis quadratis vel rotundatis. *Capsulae* ellipsoideae, 4–5 mm. longae, circiter 2·5 mm. diametro, obtuse 6-costatae.

Kenya Colony. Kakamega, on mossy twigs, Aug. 1943, E. W. Carroll, cult. and flowered Amani, *Moreau* 413 (type); Aberdare Mts., 2400 m. alt., on moss-covered twigs, Oct. 1942, Cunningham-Van Someren, cult. and flowered Amani, *Moreau* 413A; East Aberdare Mts., S. Mathiaya River, on isolated tree by river bank, Aug. 1952, *Archer* 33, cult. Hort. Kew., flowered March and November 1953.

Tanganyika Territory. West Usambara Mts., Lushoto–Mkuzi road, 1 mile E. of Magamba, 1650 m. alt., on branches of *Xymalos monospora*, June 1953, *Drummond and Hemsley* 2831.

This delightful little species is evidently widely spread in the East African forests but it is so tiny that it is easily overlooked. It is clearly related to several Réunion species but these latter are extremely poorly known. The leaves are rather remarkable, being somewhat similar to those in some species of sect. *Pectinaria* and also resembling those of certain species of *Bolusiella*. They are very fleshy, almost triangular in section, rounded or obtuse along the lower surface and scooped out on the upper surface to form a broad groove or channel. They vary much in length and thickness, those in *Archer* 33 being very short and fat whereas in the Tanganyika specimen they are much longer and narrower.

Sect. VI. **Conchoglossum** *Schltr.* in Beih. Bot. Centralbl. **36,** ii. 157, 166 (1918); Summerh. in Kew Bull. **1956,** 234, in obs.

The species of this section possess elongated stems with 1–2-flowered inflorescences in which the thin-textured flowers are yellowish, greenish or white, and rather small. On examination of all the mainland species of *Angraecum* I have decided that it is better to refer the species with several-flowered inflorescences (e.g. *A. multinominatum* Rendle) to sect. *Hildebrandtiangraecum* as was done before by Schlechter, and not to include them in the present section as I suggested in my last paper (Kew Bull. **1958,** 85). It is true that the sections proposed by Schlechter are not always clearly cut and species in one section may be very similar to those in other sections, but it is probably more convenient for the present to follow his classification, even if it is sometimes somewhat artificial, until all the species of the genus can be examined. When our knowledge of many of these, particularly the Mascarene ones, is more complete it may be possible to recast some of the sections so that they are more satisfactorily defined, or even to propose a new classification altogether.

23. **A. keniae** *Kraenzl.* in Hoehnel, Zum Rudolph See, App. 4 (1892) et in Engl. Bot. Jahrb. **17,** 59 (1893); Schltr. in Beih. Bot. Centralbl. **36,** ii, 172 (1918).

Mystacidium keniae (Kraenzl.) Rolfe in Dyer, Fl. Trop. Afr. **7,** (1897).

Distrib.: Kenya Colony.

I have not seen the type specimen of this species, it having been destroyed with the Berlin Herbarium, nor have I seen any Kenya specimens which agree with the description. It is easily distinguished by the long spur which reaches a length of 15 cm. Schlechter placed the species in sect. *Angraecum* but it seems to agree better with the present section.

24. **A. chevalieri** *Summerh.* in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936), in clavi, et in Kew Bull. **1936,** 230.

Distrib.: Liberia, Ivory Coast, Ghana, S. Nigeria, Gabon, Belgian Congo and Uganda.

This species may be recognised by the almost parallel-sided leaves with unequally bilobulate rounded apex, and the slightly S-shaped spur 15–20 mm. long which is somewhat thickened in the distal half. The most interesting feature of the species, however, is the pollinarium. There is a single viscidium which is linear-lanceolate in shape, truncate at the back or top and tapering to an acute point in front. The pollinia are attached to the upper part of the viscidium by short divergent forward-pointing stipites which curl upwards and backwards underneath the anther. The viscidium is attached between the two broad rounded lobes of the rostellum as in some other species of the genus.

25. **A. egertonii** *Rendle* in Cat. Talb. Nig. Pl. 107, t. 15, fig. 1–2 (1913); Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936).

Distrib.: S. Nigeria, Gabon.

Characterised by the short broad elliptical-lanceolate or ovate leaves and short spur with much swollen apex.

26. **A. curvipes** *Schltr.* in Engl. Bot. Jahrb. **38,** 21 (1905), et in Beih. Bot. Centralbl. **36,** ii. 167 (1918).

Distrib.: French Cameroons.

I have not seen the type specimen of this species which was destroyed but, judging from a sketch made by Rolfe and from the original description, it must be closely allied to *A. pyriforme* Summerh. It appears to be a smaller plant with considerably smaller flowers.

27. **A. modicum** *Summerh.* in Kew Bull. **1958,** 84.

Distrib.: Liberia.

This species has narrow pointed leaves and rather large flowers (tepals about 2 cm. long). The labellum is long and narrow, not differing much from the other perianth members, while the spur is about 15 mm. long, nearly straight and only slightly constricted at the middle. The species is apparently allied to *A. angustipetalum* Rendle.

28. **A. angustipetalum** *Rendle* in Cat. Talb. Nig. Pl. 106, t. 14, fig. 10–12 (1913); Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452 (1936).

A. boonei De Wild. in Bull. Jard. Bot. Brux. **5,** 183 (1916).

Distrib.: Ghana, S. Nigeria, Gabon, Belgian Congo.

Differs from *A. modicum* Summerh. in the broader but equally acute leaves, the very narrow petals, the broader labellum which is almost cordate at the base and the shorter spur with a swollen club-shaped apex.

29. **A. cultriforme** *Summerhayes*, sp. nov.; affine *A. stolzii* Schltr., a quo caule breviore, floribus majoribus, calcari multo longiore satis differt.

Herba epiphytica, glaberrima. *Caulis* ± horizontalis, usque ad 15 cm. longus, 2 3 mm. diametro, inferne radices flexuosas griseas ramosas emittens, superne subdense foliatus, ± compressus. *Folia* disticha, horizontalia, incurvatim vel arcuatim patentia; vagina arcta, 4–10 mm. longa, longitudinaliter pluri-costulata; lamina anguste oblonga, lineari-oblonga vel ligulata, leviter curvata, apice inaequaliter bilobata, lobo longiore usque ad 6 mm. longo acuto vel subacuto, lobo breviore dentiformi usque ad 2 mm. longo, usque ad 6 cm. longa, 5–10 mm. lata, flavido-viridis, aeneo-viridis vel aenea, tenuiter coriacea, nervo subtus prominulo. *Inflorescentiae* axillares, solitares, patentes, foliis breviores, apice uniflores; pedunculus gracilis, 1–2 cm. longus, basi vaginis paucis laxis vestitus; bractea ovata, acuta, pedicelli basis amplectens, 2–4 mm. longa. *Flores* flavido-virides, pallide ochracei vel aurantiaco-flavidi; pedicellus cum ovario curvatus, 6–10 mm. longus. *Sepalum* intermedium lanceolatum, acutum vel acuminatum, 11–19 mm. longum, 2–3 mm. latum; sepala lateralia oblique lanceolata, acuta vel acuminata, 11–18 mm. longa, 1·8–3·8 mm. lata. *Petala* oblique et leviter curvatim lanceolata vel lineari-lanceolata, acuminata, 10–15 mm. longa, 1·5–3 mm. lata; omnia tepala valde patentia vel reflexa, subquinque- vel subseptemnervia. *Labellum* valde concavum, lanceolato-ovatum, apice acuminatum ± recurvatum, medio carina longitudinali humili instructum, 8·5–15 mm. longum, 4·5–6 mm. latum; calcar saepius rectum, anguste cylindricum, triente apicali modice inflatum, 17–26 mm. longum, versus apicem circiter 1 mm. diametro. *Columna* brevis, crassa, 1–2 mm. longum, apice truncatum; anthera bilobatim hemisphaerica, antice leviter emarginata, polliniis ovoideis 0·8 mm. longis, stipitibus ligulatis apice rotundatis 0·5–0·7 mm. longis, viscidiis inter se parallelis linearibus circiter 0·75 mm. longis; rostellum profunde bifidum, lobis latis rotundatis.

Kenya Colony. Umba R., just N. of Tanganyika border, about 5 miles inland, on *Brachystegia oliveri*, Col. Boscawen, cult. & flowered Amani, July 1944, *Moreau* 724.

Tanganyika Territory. Tanga District, Sigi Segoma, 25 m. W. of Tanga, 150 m. alt., cult. and flowered Amani, June 1944, *Moreau* 842; Handeni Distr., Gendagenda, 450 m. alt., in riverine forest by mountain stream, on evergreen trees, cult. and flowered Mrs. Faulkner, March–April 1957, *Milne-Redhead and Taylor* 7318 (type); Iringa Distr., Mufindi East, in evergreen bush, among mosses on branches and stems, Oct. 1947, *Greenway and Brenan* 8288.

N. Rhodesia. Mporokoso Distr., Mwashye Fall, R. Mukuwe, south of Mweru Wantipa, 1200 m. alt., in fringing forest, coll. Michelmore, cult. and flowered Amani, May 1943, *Moreau* 420.

This species is clearly related to *A. stolzii* Schltr. and it also shows affinities with *A. erectum* Summerh. From *A. stolzii* it differs in the less elongated stem with much shorter internodes, the larger flowers and the relatively long slender spur which is only slightly thickened in the distal part. *A. erectum* also has longer and more laxly leafy stems, but the flowers are even larger and white in colour, while the leaves are more distinctly bilobed at the apex. The leaves in *A. cultriformis* are usually tinged with bronze or yellow-bronze.

30. **A. stolzii** *Schltr.* in Engl. Bot. Jahrb. **53,** 603 (1915).

Distrib.: Tanganyika Territory, Belgian Congo and N. Rhodesia.

This species is characterised by the elongated stems with usually rather small greenish or ochre-coloured flowers. Each inflorescence axis continues to grow from year to year, producing one flower in each year, and forming a kind of woody spur, more or less at right angles to the stem, bearing the dead peduncles of the previous flowers with the current year's flower at the extreme end. A similar structure is shown in Thouars' plate of *A. multiflorum* Thou. (Orch. Iles Austr. Afr. t. 74: 1822), but in that species each year's growth bears several small flowers. A specimen collected at Nchanga Falls in Northern Rhodesia agrees well in general features, particularly the curious inflorescence, with other material of *A. stolzii* but has considerably larger flowers (perianth, 2 cm. long). Judging by the isotype material of *A. stolzii* in the Kew Herbarium the flowers seen by Schlechter were probably very young and the measurements given by him are therefore too small, especially the spur which usually grows to its full length at a late stage in the development of the flower.

31. **A. viride** *Kraenzl.* in Engl. Bot. Jahrb. **51,** 395 (1914).

A. braunii Schltr. in Beih. Bot. Centralbl. **36,** ii. 167 (1918).

Distrib.: Tanganyika Territory.

Schlechter was quite wrong in substituting the new name *A. braunii* for Kraenzlin's trivial *viride*, and in publishing a new *A. viride* based on *Mystacidium viride* Ridl. *A. foxii* Summerh. (Kew Bull. **1948,** 278) is the correct name for the latter species.

A. viride Kraenzl. is characterised by the small green flowers borne in very short inflorescences and the short spur only about 2 mm. in length.

32. **A. erectum** *Summerh.* in Kew Bull. **1956,** 232.

Distrib.: Uganda, Kenya Colony, Tanganyika Territory and N. Rhodesia.

This species is notable for its more or less stiff erect growth, the rather long internodes and somewhat rigid leaves. In its rather large white flowers it approaches sect. *Arachnangraecum*, but in general structure the flowers are more like those of the present section and it seems best placed here.

There are gatherings in the Kew Herbarium which may represent further distinct species belonging to this section but the material is not adequate for certain determination.

Sect. VII. **Arachnangraecum** *Schltr.* in Fedde, Repert. Spec. Nov. Beih. **33,** 308, 309, 320 (1925); Perrier de la Bâthie in Humbert, Fl. Madag. Orch. **2,** 204, 292 (1941).

In this section the flowers are usually white in colour and more or less fleshy in texture and are, on the average, much larger than in any of the preceding sections. The stems are elongated and the flowers borne singly on not very long peduncles; rarely 2 flowers are developed in the inflorescence. Schlechter restricted the section to species with long spidery-like tepals but I agree with Perrier de la Bâthie in extending the concept of the section to include species in which the perianth members are not very long and narrow as I think it is impossible to draw any satisfactory demarcation line in this connection. The section as I understand it therefore includes some species which Schlechter included in his section *Eu-angraecum.*

33. **A. birrimense** *Rolfe* in Kew Bull. **1914,** 214; Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 450, 452 (1936).

Distrib.: Sierra Leone to French Cameroons.

This species may be distinguished from the allied *A. eichlerianum* Kraenzl. by the slightly smaller flowers and by the fact that the rounded lateral lobes of the labellum do not project beyond the base of the central apiculus. In general vegetative and floral features the two species are very similar.

34. **A. eichlerianum** *Kraenzl.* in Wittm. Gart. Zeit. **1,** 434, fig. 102 (1882); Rolfe in Dyer, Fl. Trop. Afr. **7,** 143 (1897); Schltr. in Beih. Bot. Centralbl. **36,** ii. 171 (1918); Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. **2,** 452, fig. 337 (1936).

A. arnoldianum De Wild., Miss. E. Laurent, **1,** 224, **2,** t. LVI–LVIII (1906).

Distrib.: S. Nigeria, British and French Cameroons, Gabon, Belgian Congo, Angola.

The differences between this species and the allied *A. birrimense* Rolfe are mentioned under that species. Owing to the upward curve of the side lobes of the labellum their projection beyond the centre is not always noticeable at first sight but becomes evident when the labellum is flattened out. As in *A. birrimense* the tepals are pale green while the labellum is white with a central bright green blotch.

35. **A. spectabile** *Summerhayes*, sp. nov.; affine *A. eichleriano* Kraenzl., a quo foliis brevioribus pro rata latioribus, penduculo paulo breviore, labelli calcari plus 6 cm. longo satis distinguitur.

Herba saxicola, usque ad 30 cm. alta, omnino glaberrima. *Caulis* ut videtur erectus, pauciramosus vel simplex, fere per totam longitudinem foliatus, leviter compressus, 4–5 mm. diametro, inferne radices flexuosas griseas instructus. *Folia* disticha, patentia vel erecto-patentia; vagina arcta, 1–2·5 cm. longa, longitudinaliter pluricostulata, leviter compressa; lamina elliptica vel elliptico-oblonga, apice angustata, inaequaliter bilobulata, lobulo longiore rotundato usque ad 12 mm. longo leviter incurvato, lobulo breviore quam lobulo longiore angustiore usque ad 4 mm. longo, in toto 5–10 cm. longa, 1·5–3 cm. lata, carnoso-coriacea, nervo subtus promin-

ulo. *Inflorescentiae* erecto-patentes, uniflores, cum flore folios superantes; pedunculus teres, fere rectus, circiter 3 cm. longus, basi vaginis pluribus circumdatus. *Flores* magni, partim virides partim albi; pedicellus cum ovario circiter 3 cm. longus. *Sepalum* intermedium lanceolatum, acutum, 4–4·5 cm. longum, circiter 1 cm. latum: sepala lateralia oblique anguste lanceolata, apice acutissima, 4·5–5 cm. longa, fere 1 cm. lata. *Petala* obliquely lanceolata, acutissima, circiter 4 cm. longa et 6 mm. lata; omnia tepala patentia vel ± reflexa, plurinervia. *Labellum* late obcordatum, antice valde emarginatum medio apiculo circiter 2·5 mm. longo interjecto, in toto 3–3·5 cm. longum, circiter 5 cm. latum, multinervium, nervis anastomosantibus; calcar ex ore lato dimidio basali anguste conicum, medio constrictum, dimidio apicali leviter incurvatum clavato-inflatum, apice ipso acutum, 6–6·5 cm. longum, basi 1–1·5 cm. diametro. *Columna* brevis, crassa, circiter 5 mm. longa, apice truncata; anthera bilobulatim hemisphaerica, antice valde emarginata, 4·5 mm. lata; polliniis non visis; rostellum profunde bifidum, lobis latis rotundatis.

Tanganyika Territory. Bukoba Distr., by Lake Victoria, July 1933, *Rogers* 456 (type); same locality, 1140 m. alt., locally abundant on rocks by lake, cult. Entebbe Bot. Gardens, June 1945, *Thomas* 4122.

This is clearly very near *A. eichlerianum* Kraenzl. but has shorter and broader leaves, an even broader labellum and a much longer spur. After *A. infundibulare* Lindl. it has the largest flowers of any mainland species.

36. **A. infundibulare** *Lindl.* in Journ. Linn. Soc. Lond. Bot. **6,** 136 (1862); Schltr. in Beih. Bot. Centralbl. **36,** ii. 172 (1918); Dandy in Exell, Vasc. Pl. S. Tomé, 331 (1944).

Angorchis infundibularis (Lindl.) Kuntze, Rev. Gen. Pl. 651 (1891).

Mystacidium infundibulare (Lindl.) Rolfe in Dyer, Fl. Trop. Afr. **7,** 170 (1897).

Distrib.: ? S. Nigeria, British Cameroons, Principe, French and Belgian Congo, Uganda.

The species possesses much the largest flowers among the mainland species of *Angraecum*. The narrow tepals and broad apiculate labellum vary between 5 and 8 cm. in length, while the spur, which tapers from a wide mouth to a constricted central area and is then widened slightly in the strongly incurved distal half, is 10–18 cm. in length.

37. **A. astroarche** Ridl. in Bol. Soc. Brot. **5,** 199. t. C, fig. a (1887); Schltr. in Beih. Bot. Centralbl. **36,** ii. 169 (1918); Dandy in Exell, Vasc. Pl. S. Tomé, 331 (1944).

Mystacidium astroarche (Ridl.) Rolfe in Dyer, Fl. Trop. Afr. **7,** 170 (1897).

Distrib.: S. Tomé.

The flowers, which are borne singly on slender peduncles as long as the leaves, are star-like and rather like a large *Aërangis* in appearance but the structure is that of *Angraecum* as are the vegetative characters. The tepals are 4–5 cm. in length but the spur is only 2·5 cm. long.

38. **A. conchiferum** *Lindl.* in Hook. Comp. Bot. Mag. **2,** 205 (1837); Bolus, Ic. Orch. Austr.-Afr. **2,** t. 4 (1911); Rolfe in Dyer, Fl. Cap. **5,** iii. 70 (1912); Schltr. in Beih. Bot. Centralbl. **36,** ii. 170 (1918).

Angorchis conchifera (Lindl.) Kuntze, Rev. Gen. Pl. 651 (1891).

Angraecum verrucosum Rendle in Journ. Bot. Lond. **33,** 250 (1895); Schltr. in Beih. Bot. Centralbl. **36,** ii. 174 (1918).

Mystacidium verrucosum (Rendle) Rolfe in Dyer, Fl. Trop. Afr. **7,** 171 (1897).

Angraecum scabripes Kraenzl. in Engl. Bot. Jahrb. **33,** 73 (1902).

Distrib.: Tanganyika Territory, Nyasaland, S. Rhodesia, Mozambique, Natal, Cape Province.

The leaves in this species are appreciably smaller than in any other mainland representative of the section, being up to 8 cm. long, and less than 1 cm. wide, often much narrower. The inflorescences are not infrequently 2-flowered, a feature not usual in this section but occasionally occurring in other species. The species is clearly closely allied to *A. ramosum* Thou. but the leaves are longer and narrower and the flowers smaller.

Sect. VIII. **Afrangraecum** *Summerhayes*, sect. nov. Caulis elongatus, foliatus; folia usque ad 20 cm. longa et 3·5 cm. lata; inflorescentiae axillares, elongatae sed foliis saepius breviores, pluriflorae sed floribus succedaneis singulis, vel abortu uniflorae; flores mediocres vel majusculi, albi, ± carnosi.

Species typica sectionis:—*A. reygaertii* De Wild.

This section is evidently allied to sect. *Arachnangraecum*, the species included being very similar in vegetative characters. The inflorescences are, however, longer and more slender and are usually several-flowered, although only one flower is open at any time and sometimes all but one fail to develop. The few-flowered inflorescences indicate an affinity also with sect. *Angraecum* in which the inflorescences are several- to many-flowered. All three species are native of the African mainland. An interesting feature is the fusion of the lower part of the pedicel with the rhachis so that each flower appears to arise some distance above the corresponding bract. The flowers are white, often with a green central spot on the labellum and are rather fleshy in texture.

39. **A. reygaertii** *De Wild.* in Bull. Jard. Bot. Brux. **5,** 190 (1916).

Distrib.: Belgian Congo.

Characterised by the long broad leaves, the rather large flowers (sepals to 4·5 cm. long) and nearly straight spur about 7 cm. long.

40. **A. mofakoko** *De Wild.* in Bull. Jard. Bot. Brux. **5,** 189 (1916).

Distrib.: Belgian Congo.

The leaves in this species are smaller and narrower than in *A. reygaertii* while the flowers are also smaller (sepals 18–25 mm.). The spur is about 3–3·5 cm. long with a slight kink in the middle, the distal half being somewhat reflexed. The two pollinia are attached to a broad triangular or quadrate viscidium by short broad stipites.

41. **A. ligulatum** *Summerhayes*, sp. nov.; ab *A. mofakoko* De Wild. foliis pro rata angustioribus, floribus minoribus, labelli calcari dimidio apicali magis inflato, viscidiis duobus distinctis satis differt.

Herba epiphytica, omnino glaberrima. *Caulis* elongatus, usque ad 20 cm. longus vel ultra, leviter flexuosus, sublaxe foliatus, radices flexuosas ramosas griseas emittens, leviter compressus, 3–5 mm. diametro. *Folia* erecto-patentia, disticha; vagina arcta, circiter 2 cm. longa, longitudinaliter pluricostulata; lamina ligulata vel oblongo-ligulata, basi angustata, apice inaequaliter lobulata, lobulo longiore usque ad 8 mm. longo rotundato leviter incurvato, lobulo breviore brevissimo vel fere nullo, 11–15 cm. longa, 12–20 mm. lata, tenuiter coriacea, multinervis. *Inflorescentiae* axillares, graciles, 4–7 cm. longae, 1–4-florae, foliis breviores; pedunculus 2·5–3 cm. longus, teres, basi vagina vestitus; bracteae basi vaginantes, ovatae, acutae vel acuminatae, 3–5 mm. longae, scariosae. *Flores* erecto-patentes, succedanei, albi, carnosuli; pedicellus cum rhachide per 5–7 mm. conjunctus, parte libera (ovario incluso) 10–15 mm. longa basi articulata. *Sepalum* intermedium oblongo-lanceolatum, breviter acuminatum, circiter 12·5 mm. longum, 4·5–5 mm. latum; sepala lateralia oblique oblongo-lanceolata, apice acuminata, 14 mm. longa, 3·5–4 mm. lata. *Petala* oblique lanceolato-oblongo, apice acuta vel apiculata, circiter 11 mm. longa et 4 mm. lata; omnia tepala patentia, subseptemnervia. *Labellum* valde concavum, lanceolato-ovatum, acutum, 10–10·5 mm. longum, 5·5–6 mm. latum; calcar leviter sigmoideum, ex ore lato subito angustatum, medio anguste cylindricum, dimidio apicali modice clavato-inflatum, 2–2·5 cm. longum. *Columna* brevis, crassa, apice truncata, circiter 1·5 mm. longa; anthera non visa, polliniis oblique ovoideis 0·7 mm. longis, stipitibus ligulatis 0·65 mm. longis, viscidiis duobus distinctis anguste oblongis 0·8 mm. longis; rostellum profunde bifidum, lobis latis quadrato-rotundatis 2 mm. longis.

Uganda. Kigezi, Impenetrable Forest, 1500 m. alt., on forest tree, April 1948, *Purseglove* 2668 (type).

This species differs from *A. mofakoko* De Wild. by the characters given in the diagnosis. The spur is gently S-curved or almost straight but does not have the distinct kink and change of direction at the centre so characteristic of De Wildeman's species.

Sect. IX. **Angraecum.**

Eu-angraecum Schltr. in Beih. Bot. Centralbl. **36,** ii. 158, 169 (1918) et in Fedde, Repert. Spec. Nov. Beih. **33,** 309, 310, 355 (1925).

The type section of the genus contains species with elongated stems and rather large white or greenish white fleshy flowers in several- or many-flowered inflorescences.

42. **A. giryamae** *Rendle* in Journ. Linn. Soc. Lond. Bot. **30,** 388 (1895); Rolfe in Dyer, Fl. Trop. Afr. **7,** 143 (1897).

Distrib.: Kenya Colony, Tanganyika Territory, Zanzibar and Pemba.

Characterised by the long strap-shaped leaves up to 60 cm. in length and 7 cm. wide, and tall many-flowered inflorescences as much as 80 cm. long. The tepals are 3–4 cm. long, the labellum very broad and apiculate at the apex, while the comparatively slender spur is about 4–6 cm. in length. The species is clearly allied to the Madagascan *A. eburneum* Bory (the type species of *Angraecum*) and *A. superbum* Thou. and to *A. brongniartianum* Rchb. f. ex Lind. from the Seychelles.

Taeniophyllum (subgen. **Codonosepalum**) **coxii** (*Summerh.*) *Summerh.* comb. nov.

Ankylocheilos coxii Summerh. in Bot. Mus. Leafl. Harv. Univ. **11,** 169 (1943).

When I described the genus *Ankylocheilos* from a plant collected in Ghana I overlooked the genus *Taeniophyllum* as its nearest representative occurs in Ceylon which is over 5000 miles from Ghana. On examination, however, of the floral structure of the West African plant it can be seen to agree very closely with that of the sub-genus *Codonosepalum* of *Taeniophyllum*. In fact the flowers of some species of this group occurring in Java and other Malaysian islands are only distinguishable from *Ankylocheilos* in minor features. When I described the latter genus I discovered only two pollinia in the single flower available for examination but I have recently seen material from the Belgian Congo which agrees with *A. coxii*, but which has 4 pollinia, two large and two small. It is probable that I overlooked the two smaller pollinia in the Ghana material.

The Asiatic species of this affinity are referred to two genera, *Taeniophyllum* with 4 pollinia, and *Microtatorchis* in which there are only 2 pollinia. In each of these genera, so far as I can gather from examination of the data available, the pollinia are all equal or almost equal in size. The African species, in which the two pollinia in each pair are manifestly unequal, therefore lies between these two. It appears to me that the sub-genus *Codonosepalum* of *Taeniophyllum* is more closely allied to the genus *Microtatorchis* than to the remainder of its own genus, in spite of the number of pollinia in each case, the general floral structure being very similar and markedly different from that in the type sub-genus of *Taeniophyllum*. The African species, which agrees with both *Microtatorchis* and with *Taeniophyllum* sub-genus *Codonosepalum* as regards the floral structure, may be looked upon as bridging the gap between them in pollinia characters.

As, however, my knowledge of the Asiatic species of these two genera is on the whole restricted to those species which have been illustrated I do not feel inclined to carry out any large scale re-arrangements of the genera, though I feel that a more natural classification might well be to refer the species with sepals and petals more or less united to one genus and those with sepals and petals free to another irrespective of the number of pollinia. Other characters, such as the structure of the labellum, are associated with the above and produce a strikingly different floral ensemble in the two groups.

Until such a re-arrangement has been considered by someone who can investigate the whole group thoroughly it seems best to leave the classification as it is, and consequently the African species, which has four pollinia, falls into the genus *Taeniophyllum*.

Diaphananthe suborbicularis *Summerhayes*, sp. nov.; affinis *D. plehnianae* (Schltr.) Schltr., a qua foliis angustioribus, floribus minoribus, sepalis pro rata latioribus, petalis minus obliquis, labello fere orbiculari vel quadrato-orbiculari, calcari quam labello breviore satis differt.

Herba epiphytica, parva, omnino glabra. *Caulis* breviter elongatus, usque ad 5·5 cm. longus, 4–5 mm. diametro, inferne radices flexuosas brunneas

vel griseo-brunneas emittens, vaginis foliorum delapsorum fere omnino obtectus, superne subdense foliatus. *Folia* disticha, ± horizontaliter expansa, leviter incurvata; vagina fere 5 mm. longa, longitudinaliter costulata; lamina lineari-oblanceolata vel anguste oblongo-lanceolata, leviter curvata, apice inaequaliter et obscure bilobulata, lobulo longiore acuto usque ad 4 mm. longo, lobulo breviore brevissimo vel fere nullo, 5–7·5 cm. longa, 7–13 mm. lata, carnosula et coriacea, costa subtus prominula. *Inflorescentiae* ex axillis foliorum exorientes, ut videtur singulae, usque ad 4·5 cm. longae, laxe 3–6-florae; pedunculus et rhachis teres, 1–1·5 mm. diametro; bracteae e basi vaginanti breviter triangulares, acutae, 1–1·5 mm. longae, ovario pedicellato satis breviores. *Flores* singuli, patentes, incarnati vel pallide rubri; pedicellus cum ovario 2·5–3 mm. longus. *Sepalum* intermedium ovato-lanceolatum, apice acutum, 3·5 mm. longum et 2 mm. latum; sepala lateralia leviter obliqua, late lanceolata, apice acuta, circiter 4 mm. longa et 3 mm. lata; omnia sepala leviter incurvata, trinervia. *Petala* lanceolato-oblonga, apice subacuta, levissime obliqua, circiter 3 mm. longa et 1·5 mm. lata, binervia. *Labellum* sessile, fere orbiculare vel quadrato-orbiculare, apice leviter emarginatum apiculo interjecto, circiter 4 mm. longum et 4·5 mm. latum, marginibus leviter sinuatis, plurinervium, ante ostium calcaris callo dentiformi erecto obtuso instructum; calcar fere rectum, basi constrictum, superne clavato-inflatum, apice ipso rotundatum, circiter 2·75 mm. longum. *Columna* brevis, crassa, circiter 1·5 mm. longa, androclinio obliquo dorso rotundato breviter emarginato; anthera leviter bilobulatim hemisphaerica, antice rotundata, 1·2 mm. lata, polliniis non visis, stipitibus duobus linearibus superne dilatatis 0·8 mm. longis, viscidio communi parvo orbiculari; rostellum decurvatum, viscidio amoto bifidum, lobis subulatis, fovea stigmatica ± quadrata.

Ghana. Togo, between Kpandu and Wurobong, epiphytic on cocoa, Oct. 1954, *Westwood* 158 (type).

This not very remarkable species of the genus is allied to *D. plehniana* (Schltr.) Schltr. from which it differs by the characters given in the diagnosis. The broad almost orbicular labellum is characteristic, this organ being usually longer than broad in the group to which the species belongs. The stem, though slightly elongated, is not comparable with that in those species with truly elongated stems.

Chamaeangis (sect. **Chamaeangis**) **lanceolata** *Summerhayes*, sp. nov.; a *C. ichneumonea* (Lindl.) Schltr. foliis angustioribus, petalis lanceolatis acutis, labello lanceolato acuto apice haud tridentato, calcari breviore vesiculo minus elongato, a *C. vesicata* (Lindl.) Schltr. floribus ad nodos racemi singulis nec geminis nec verticillatis majoribus, a *C. thomensi* (Rolfe) Schltr. petalis et labello lanceolatis acutis, calcari longiore satis differt.

Herba epiphytica, radicibus exceptis glaberrima; caulis brevissimus, usque ad 3 cm. longus, superne dense foliatus, inferne radices flexuosas brunneo-griseas emittens, circiter 3 mm. diametro. *Folia* ± pendentia; vagina circiter 5 mm. longa, longitudinaliter pluri-costulata; lamina oblique vel leviter curvatim lineari-lanceolata vel lineari-oblonga, apice acuta, 6–28 cm. longa, 7–21 mm. lata, carnosa, marginibus leviter recurvatis, siccitate nervis pluribus prominulis. *Inflorescentiae* pendentes, simpliciter racemosae vel rarius paniculatae, usque ad 35 cm. longae; rami usque ad 4, usque ad 7 cm. longi;

pedunculus usque ad 18 cm. longus, teres, gracilis, vaginis pluribus dissitis usque ad 4 mm. longis obtusis instructus; rhachis leviter angulata, pallide viridis; bracteae basi vaginiformes, superne triangulares, acutae, patentes, usque ad 4 mm. longae. *Flores* ad nodos singuli, deflexim patentes, viridi-ochracei, leviter suaveolentes; pedicellus cum ovario 5–6 mm. longus. *Sepalum* intermedium ovatum vel oblongo-ovatum, apice subulato-acuminatum, acumine reflexo, 3·5–5 mm. longum, 2·5–3 mm. latum, trinervium; sepala lateralia oblique oblongo-elliptica, apice subulato-acuminata, 4·75–5·5 mm. longa, 2·5–2·75 mm. lata, tri- vel subquinquenervia. *Petala* leviter oblique lanceolata, apice acuta leviter curvata, 3–4 mm. longa, 1·5–1·75 mm. lata, uni- vel trinervia; omnia tepala valde recurvata, marginibus ± recurvatis, subcarnosa. *Labellum* decurvatum, lanceolatum vel triangulari-lanceolatum, marginibus recurvatis, apice acutum recurvatum 2·75–3·5 mm. longum, circiter 2 mm. latum, carnosum, obscure trinervium; calcar ± valde incurvatum, duobus trientibus vel tribus quartis partibus basalibus anguste cylindricum, prope apicem ellipsoideo-dilatatum obtusum, circiter 12 mm. longum, quo latissimo 1·3–1·9 mm. diametro. *Columna* brevis, crassa, 1–1·5 mm. longa, apice truncata, androclinio leviter excavato; anthera hemisphaerica, antice rotundata, polliniis fere globosis vel ellipsoideis 0·3 mm. longis, stipitibus duobus distinctis linearibus apice dilatatis 0·6 mm. longis, viscidio communi oblongo utroque rotundato 0·3 mm. longo; rostellum deflexum, triangulare, acutum, viscidio amoto profunde bifidum, fovea stigmatica transverse quadrata.

Southern Nigeria. Benin Province, Sapoba, Jamieson River, on trees by river, 1935, *Kennedy* 2731; 2732; same locality, Nov. 1949, *Meikle* 607 (type).

This species resembles *C. ichneumonea* (Lindl.) Schltr. and *C. thomense* (Rolfe) Schltr. in its singly placed flowers and *C. vesicata* (Lindl.) Schltr. in the general floral structure. It differs from each of them by the characters given in the diagnosis. I have not seen the type specimen of *C. thomensis*, which cannot be found, but Rolfe's description differs in certain features and these differences seem likely to be significant judging from the genus as a whole. *C. lanceolata* is known at present only from one locality in Southern Nigeria. The inflorescence in *Kennedy* 2731 is branched with four short branches, but whether this feature is at all common in the species cannot be determined; all the inflorescences in the type gathering are simply racemose. The only other example of a branched inflorescence which I have seen in the genus *Chamaeangis* (in *C. odoratissima* (Rchb. f.) Schltr.) was suggestive of fasciation, but there are no indications of this in the Kennedy material of *C. lanceolata*.

Solenangis angustifolia *Summerhayes*, sp. nov.; inter species generis foliis linearibus lateraliter compressis eis *Iridis* similibus, labelli calcari breviter conico limbo breviore facile distinguitur.

Herba epiphytica, pusilla, pedunculo rhachide et ovario exceptis glaberrima. *Caulis* elongatus, gracillimus, flexuosus, ut videtur semper simplex, usque ad 25 cm. longus, circiter 1 mm. diametro, fere per totam longitudinem radices flexuosas griseas carnosas quam caulem crassiores emittens, apice paucifoliatus. *Folia* lateraliter compressa, linearia, apice acuta, 1–2 cm. longa, 1–2 mm. lata, paucinervia, carnosula. *Inflorescentiae* ex axillis foliorum

vel foliorum delapsorum exorientes, folios aequantes vel superantes, usque ad 3 cm. longae, pauciflorae; pedunculus gracilis, usque ad 1·5 cm. longus, teres, basi vagina arcta circumdatus, ut rhachis sparsiuscule nigro-puberulus; rhachis leviter fractiflexa; bracteae brevissimae, e basi vaginante obtuse triangulares, ovario pedicellato valde breviores. *Flores* arcuatim suberecti, albi vel viridi-albi; pedicellus cum ovario curvatus, 2–3 mm. longus, nigro-pubescens. *Sepalum* intermedium oblongum vel lanceolato-oblongum, apice acutum vel obtusum, 2·5–3·5 mm. longum, 1·2–1·5 mm. latum; sepala lateralia oblique et leviter curvatim oblonga vel lanceolato-oblonga, apice acuta vel obtusa, 2·8–3·3 mm. longa, 1·1–1·3 mm. lata; omnia sepala trinervia vel rarius uninervia. *Petala* anguste oblonga vel lineari-ligulata, leviter curvata, apice subacuta vel obtusa, 2·3–2·7 mm. longa, 0·7–1 mm. lata, uninervia; omnia tepala ± conniventia, saccis cristalliferis parvis instructa. *Labellum* valde concavum, oblongum, apice rotundatum vel obtusum leviter recurvatum, 3–3·5 mm. longum, 1·5–2·5 mm. latum, tri- vel quinquenervium; calcar incurvatum, breviter et late conicum, apice rotundatum, 1·75–2·25 mm. longum. *Columna* fere teres, circiter 1 mm. longum, apice truncatum; androclinium transversum, leviter excavatum; anthera hemisphaerica, antice breviter producta et leviter emarginata; pollinia pyriformia vel ovoidea, 0·4–0·5 mm. longa, stipite communi basi angusto apice flabellatim expanso 0·4 mm. longo, viscidio triangulari-ovato vel fere elliptico antice truncato vel leviter emarginato, 0·4–0·5 mm. longo; rostellum productum, viscidio amoto bifidum, lobis oblongis obtusis apice breviter incurvatis, fovea stigmatica quadrata; ovarium obtusissime 6-costulatum.

Tanganyika Territory. Lushoto Distr., West Usambara Mts., Shagayu Peak, Shagai Forest, 2230 m. alt., epiphyte on *Podocarpus milanjianus*, May 1953, *Drummond and Hemsley* 2548; Mbulu Distr., Nou Forest, 1800 m. alt., in moss on small trees, *Moreau* 316.

Southern Rhodesia. Umtali Distr., Himalaya Range, 1750 m. alt., on forest trees, Oct. 1950, *Greatrex* S. Rhod. Gov. Herb. 29830; same area, Engwa, 1800–1920 m. alt., epiphyte in *Podocarpus* forest, March 1954, *Wild* 4439 (S. Rhod. Gov. Herb. 46216); 4536 (S. Rhod. Gov. Herb. 46217) (type); same locality, 1700 m. alt., in forest patches on *Cussonia*, *Podocarpus*, etc., Feb. 1955, *Exell, Mendonça and Wild* 48.

This easily overlooked species is probably widespread in suitable forests in East Africa and should be looked for. It may be distinguished from other species of the genus by its more slender habit, the very narrow leaves which are *Iris*-like in character and placed in the same plane as the stem, and the relatively short conical spur which is shorter than the labellum. In general floral characters there is a strong resemblance to some species of the typical section of *Microcoelia* (e.g. *M. stolzii* (Schltr.) Summerh., and *M. ericosma* Summerh.) but the elongated stem and large viscidium are characteristic of *Solenangis*.

Notes on Cyperaceae: XLIII*

E. Nelmes

A misidentified species.

During the preparation of *Eleocharis* for the Fl. Trop. E. Africa it was noted that there was an Angolan specimen identified by C. B. Clarke as *E. palustris* R. Br., which in general appearance closely resembled that common European species. It was found, however, that the characters of the achene were very different from those of *E. palustris*, and not only was the African plant a new species but it was more closely related to another African species, *E. marginulata* Hochst. ex Steud., than to the European plant.

Eleocharis welwitschii *Nelmes*, sp. nov.; affinis *E. marginulatae* Hochst. ex Steud., sed spicis brevioribus, glumis plus minusve oblongis brevioribus, achaeniis brevioribus cum basi styli dimidium latitudinis achaenii ipsius plerumque aequante, setis 0 vel paucis subtilissimis differt.

More or less tufted on a stout, hard rhizome. Stems erect or somewhat curved, 10–25 cm. tall, 0·75–1·5 mm. thick, smooth; sheaths often bright reddish. Spike 1, ovoid or cylindric-ovoid, apex acute, 6–10 mm. long, 2·5–4 mm. thick below, many-flowered. Glumes oblong-ovate or oblong with rounded upper corners, boat-shaped, apex very obtuse or rounded, 2–3 mm. long, glabrous, chestnut coloured with very wide whitish margins and a pale broad midrib not nearly extending to the apex. Achene obovate or sometimes elliptic-obovate, biconvex or plano-convex, 1·2–1·4 mm. long, 0·9–1 mm. broad, light dull yellowish, narrowing above into an extremely short neck and expanding into a truncate-annulate apex, on which is situated the more slender style-base, and which is one-third to one half as wide as the achene itself. Bristles 0 to few, weak and straggly, from very short up to about as long as the achene proper, reddish-brown to paler. Stigmas absent, probably 2. Stamens 3?

Angola. Huilla, damp sandy places by the river in the Lopollo District, in flower and fruit, April 1860, *Welwitsch* 6969 (holotypus, Lisboa (LISU); isotypus, Kew.).

*Continued from K.B. 1958, 150.

The Genus Caylusea St. Hil. in Tropical Africa

P. Taylor

Jean Mueller (Muell. Arg.) in his monograph published just over 100 years ago*, recognised two species of *Caylusea* and none appears to have been described since. It is of considerable interest, therefore, that a specimen of a third species should have been recently received from a botanically little known part of northern Kenya.

In this paper the new species is described, and, as both of the other species occur in tropical Africa, I have added a key to the genus and cited specimens to indicate the geographical range of all the species within the area. The specimens cited are all in the Kew Herbarium unless it is stated otherwise.

I am indebted to my friend, Dr. H. Huber, for assistance with the latin diagnosis and to the authorities at the Frankfurt Herbarium for the loan of a specimen.

Caylusea *St. Hil.*, Deuxième Mém. Réséd. 29 (1837) nom. conserv.

Hexastylis Raf., Fl. Tell. **3**: 73 (1837).

Stylexia Raf., Fl. Tell. **4**: 121 (1838).

Seeds minutely and densely tuberculate:

Adaxial petals [5] 7–9-lobed; abaxial petals 3-lobed; stems puberulous to pubescent; leaves linear to linear-lanceolate, acute; margin undulate, usually shortly ciliate; midrib beneath puberulous; seeds 0·9–1·1 mm. long, pale brown when ripe, the minute tubercles not very prominent and often scarcely visible at magnifications of less than × 50 1. *C. hexagyna*

Adaxial petals 2–3-lobed; abaxial petals simple or 2-lobed; stems pubescent; leaves lanceolate-elliptic, acute or acuminate; margin plane, glabrous; midrib beneath glabrous or sparsely puberulous; seeds 1·1–1·2 mm. long, very dark brown or black when ripe, the minute tubercles very prominent and plainly visible at a magnification of × 10 . . . . . 2. *C. latifolia*

Seeds rugulose, 1·2–1·4 mm. long, black when ripe, covered with small rounded prominences—plainly visible at a magnification of × 10—which often become more or less confluent to form a series of transverse wrinkles; adaxial petals 4–5-lobed; abaxial petals simple or 2-lobed; stems usually glabrous, sometimes sparsely puberulous; leaves linear to lanceolate, acute; margin glabrous or ciliolate, plane or undulate; midrib glabrous or sparsely puberulous . 3. *C. abyssinica*

* Monographie de la Famille de Résédacées 225 (1857).

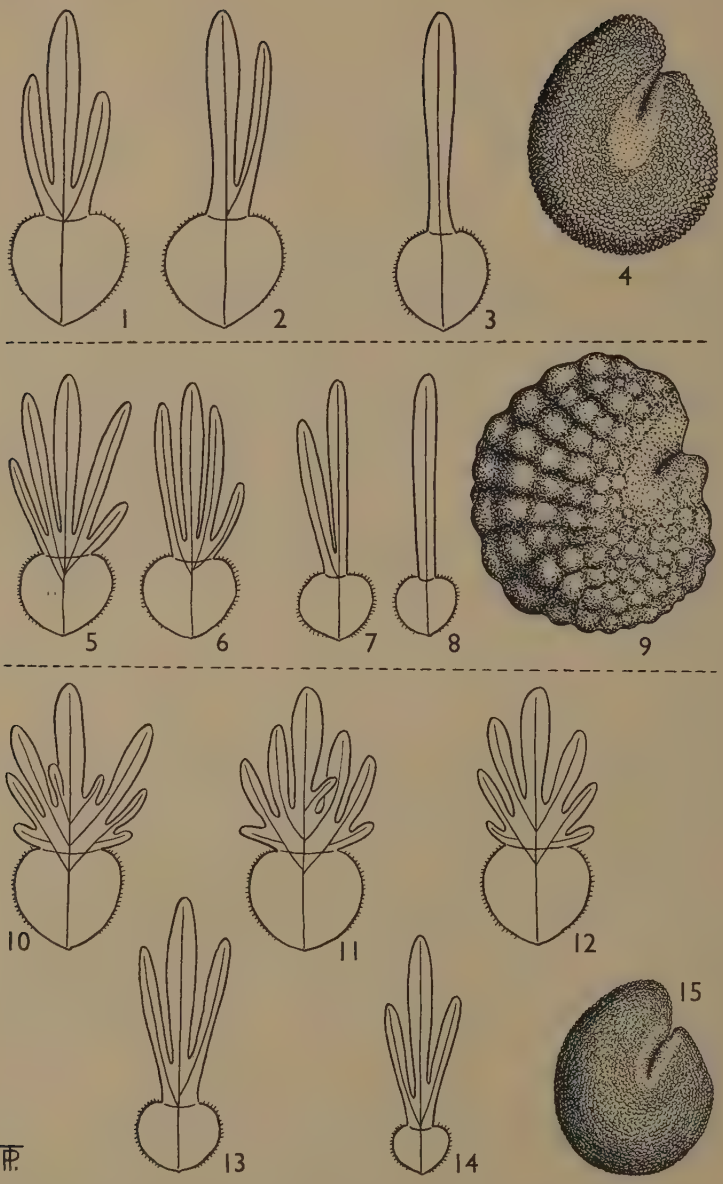

FIG. 1. *Caylusea latifolia* P. Tayl.—1 & 2, adaxial petals, × 12; 3, abaxial petal, × 12; 4, seed, × 30. *Caylusea abyssinica* (Fresen.) Fisch. et Mey.—5 & 6, adaxial petals, × 12; 7 & 8, abaxial petals, × 12; 9, seed, × 30. *Caylusea hexagyna* (Forsk.) M. L. Green—10, 11 & 12, adaxial petals, × 12; 13 & 14, abaxial petals, × 12; 15, seed, × 30.

1. Caylusea hexagyna (*Forsk.*) *M. L. Green* in Prop. Brit. Bot. 102 (1929); Dandy in F. W. Andrews, Fl. Pl. Anglo-Egypt. Sudan **1**: 66 (1950); Cufodontis in Bull. Jard. Bot. Brux. **24**, suppl.: 159 (1954).

[*Reseda canescens* (non L., Sp. Pl.)—L., Syst. Nat. **2**: 330 (1767)].

Reseda hexagyna Forsk., Fl. Aegypt.-Arab. 92 (1775).

Caylusea canescens (Murray) Webb in Hook., Niger Flora 101 (1849); Muell. Arg., Monog. Réséd. 226 (1857); Oliv., Fl. Trop. Afr. **1**: 102 (1868);Pirotta, Fl. Eritrea 258 (1903).

Eritrea. Goura, 2100 m., 11 March 1892, *Schweinfurth & Riva* 925. Anseba valley, 24 km. N. of Karen, 21 March 1949, *Bally* 6636. Halibai Plains, 80 m., 2 April 1949, *Bally* 6937.

Sudan Republic. Red Sea Hills, Erkowit, 1300–1700 m., 1 March 1932, *Aylmer* 158; ibid., 28 March 1953, *J. K. Jackson* 2748. Gash Delta, Nov.–Dec. 1936, *F. W. Andrews* 250. Port Sudan, 17 Jan. 1953, *Drummond & Hemsley* 959.

Pirotta (*loc. cit. supra*) cites many more specimens from Eritrea. *C. hexagyna* also occurs in the Cape Verde Islands and the more arid parts of N. Africa and the Middle East.

Habitat. Semi-desert, sometimes as a weed of cultivation, sea level to 2100 m.

The type of *Reseda hexagyna* Forsk. (collected in Arabia by Forskal) is at the Botanical Museum and Herbarium, Copenhagen and has not been seen by me.

The indumentum, the lobing of the adaxial petals and the degree of development of the minute tubercles which cover the seed coat are all rather variable in this species. The adaxial petals are usually 7- to 9-lobed but in depauperate specimens the number is reduced to 5 and sometimes the tubercles are so ill developed as to make the seeds appear smooth (see Fig. 1, 10–15).

2. Caylusea latifolia *P. Tayl.* sp. nov. A *C. hexagyna* (Forsk.) M. L. Green, cui affinis est, foliis latioribus et petalis adaxialibus 3-lobis—nequaquam plus quam 3-lobis—inter alia recedit.

Radix haud visa. *Caules* e basi ramosi, lignescentes herbacei, stricte erecti, inflorescentia exclusa 12–20 cm. alti, dense foliati, tenuiter striati, breviter albo-pubescentes. *Folia* subsessilia, lanceolato-elliptica, basi cuneata, apice acute vel fere acuminata, ad 6 × 2 cm. longa et lata, margine laevia (nec undulata), nervis lateralibus vix visibilibus oblique ascendentibus; lamina in nervo mediano imprimis subtus sparse puberula, ceterum glabra. *Racemus* densiflorus spiciformis, c. 20 cm. longus, 12 mm. latus, rhachide cano-pubescente, bracteis lanceolatis apice subulatis c. 1·5 mm. longis, ut videtur glabris, pedicellis erecto-patentibus, sub anthesi c. 2 mm. longis, minute puberulis. *Calyx* fere ad basin 5-fidus, segmentis in anthesi patentibus, subaequalibus, oblongis, obtusiusculis, 1·5–2 mm. longis, foliaceis, glabris, sub fructu erectis, persistentibus, haud accrescentibus. *Petala* 5, dimorpha, c. 4 mm. longa, alba; 2 adaxialia basi inverse reniformia, c. 1·5 mm. longa et lata, in sinu appendicibus vulgo 3, quarum media oblanceolata, c. 2·5 mm. longa, lateralibus linearibus, quam media angustioribus, atque triente brevioribus instructa; nonnunquam alter loborum lateralium abortus; 3 abaxialia basi obovato-orbiculata, c. 1 mm. longa atque lata appendice unica oblanceolata c. 3 mm. longa provisa. *Discus* stipite minuto elevatus, leviter carnosus, staminum basin cingens, in latere adaxiali dilatatus, abaxiali attenuatus. *Stamina* c. 15, filamentis linearibus 2·5–3 mm. longis,

apice attenuatis, margine minutissime ciliolatis; antherae ovatae basi leviter excisae, c. 1 mm. longae, flavae. *Ovarium* stipitatum, staminibus fere aequilongum, 5–6-carpellatum; in fructu folliculis stellato-patentibus; fructus 5 mm. diametro. *Semina* 7–8 in quoque folliculo, ovoideo-hippocrepidiformia, dense minute papilloso-tuberculata, c. 1·2 mm. longa, matura atra.

KENYA. Northern Frontier Province; Huri Hills, 1500 m., July 1957, *Adamson* 628 (EA, isotype, K, holotype):—a small herb on top of volcanic hills, flowers white.

HABITAT: probably semi-desert scrub.

The seeds of *C. latifolia* are very similar to those of *C. hexagyna* but slightly larger and with more prominent tubercles. The most reliable character for distinguishing the two species is the number of lobes on the adaxial petals: 2 or 3 in *C. latifolia* and usually 7 or more (certainly never less than 5) in *C. hexagyna* (see fig. 1, 1–4).

3. Caylusea abyssinica (*Fresen.*) *Fisch. et Mey.* in Ind. Sem. Hort. Petrop. **7**: 43 (1840); A. Rich., Tent. Fl. Abyss. **1**: 14 (1847); Muell. Arg., Mon. Réséd. 229 (1857); Oliv., Fl. Trop. Afr. **1**: 103 (1868); Pirotta, Fl. Eritrea 258 (1903); F. W. Andrews, Fl. Pl. Anglo Egypt. Sudan **1**: 66 (1950); Cufodontis in Bull. Jard. Bot. Brux. **24,** suppl.: 158 (1954); J. Elffers in Kew Bull. 1955: 630 (1956).

Reseda abyssinica Fresen. in Mus. Senck. **2**: 106 (1837).

ERITREA. Hamasen, Sala Dharo, 2311 m., 7 Oct. 1902, *Pappi* 214.

ETHIOPIA. *Schimper* 103 (K, neotype) & 1937; Gondar, *Massey* 57; L. Tana, 1850 m., 22 Nov. 1937, *Pichi-Sermolli* 144; Solé, near Shashamanné, 2300 m. 8 Feb. 1954, *Mooney* 5709. Agheremariam, 1890 m., 29 Nov. 1952, *Gillett* 14475.

SUDAN REPUBLIC. Red Sea District, 0–1300 m., fide *F. W. Andrews, loc. cit. supra.*

UGANDA. Northern Province; Acholi District, Agoro, 1350 m., 12 Nov. 1945, *A. S. Thomas* 4355; Karamoja District, Moruongule, 1800 m., June 1942, *Dale* 246. Western Province; Kigezi District, Kabale, 1950 m. March 1950, *Purseglove* 3348.

KENYA. Northern Frontier Province; Moyale, 1100 m., 9 Oct. 1952, *Gillett* 14020. Rift Valley Province; Uasin Gishu District, Eldoret, 2100 m., 28 Aug. 1948, *Bogdan* 1892. Central Province; Nairobi, 1700 m., 1 April 1930. *Napier* 845; Embu District, Thiba R., 1830 m., 4 Nov. 1939, *Copley* 406; Machakos District, Chyulu, 1560 m., 23 April 1938, *Bally* 7993. Masai Province; Ngong Hills, 2160 m., 26 Dec. 1952, *Bally* 8457; Nguruman Hills, 1500 m., 1 Oct. 1944, *Bally* 3858.

TANGANYIKA. Northern Province; Moshi District, Lyamungo, 1320 m., 24 Aug. 1932, *Greenway* 3139; Masai District, Ngorongoro, 1800 m., 3 April 1941, *Bally* 2224. Central Province; Kondoa District, Kondoa Irangi, 1600 m., 27 Aug. 1932, *Geilinger* 1673; Dodoma District, Kazikazi, 1260 m., 13 May 1932, *Burtt* 3615. Eastern Province; Uluguru Mts., 1200 m., 26 Jan. 1935, *E. M. Bruce* 644. Southern Highlands Province; Mbeya District, N. side of Poroto Mts., 1800 m., 8 March 1032, *St. Clair-Thompson* 731; Iringa District, Tanangozi, 1710 m., 13 July 1956, *Milne-Redhead & Taylor* 11066.

HABITAT: upland grassland, sometimes as a weed of cultivation, 1200–2800 m.

C. abyssinica differs from the other two species most markedly in the shape and especially the texture of the seeds. The lobing of the adaxial petals is different from that of both other species, the lobes being fewer than in *C. hexagyna* and more than in *C. latifolia* (see Fig. 1, 5–9).

A New Species of Sesbania from Africa*

S. I. Ali

Sesbania sinuo-carinata *Ali*, sp. nov.

Caulis erectus, glaucus, leviter costatus, glaber, haud aculeatus, alterne ramosus. *Folia* imparipinnata, stipulis c. 7–13 mm. longis, c. 1–2 mm. latis, lateralibus, liberis, acuminatis, glabris, caducis; rhachide vulgo 20–45 cm. (raro 12 cm. tantum) longa, glabra, aculeata; foliolis numerosis, plerumque oppositis, petiolulis < 1 mm. longis, glabris; lamina pro majore parte 1–2, rarius 7 ad 25 mm. longa, c. 5–6 mm. lata, integra, mucronata, glabra. *Inflorescentia* racemosa, 6–9-flora, axi glabra, leviter costata, haud aculeata. *Flores* bracteis c. 5–7 mm. longis, acuminatis, glabris, caducis; pedicello c. 6–14 mm. longo, glabro, subcostato, bracteolis c. 4–5 mm. longis, acuminatis, glabris, caducis, a flore c. 1– < 3 mm. remotis suffulti. *Calyx* c. 5–6 mm. longus, campanulatus, glaber, 5-dentibus deltoideis c. 1 mm. vel minus longi, acuti. *Corolla* flava vel flavi-aurantiaca, plerumque atripurpureo punctata; vexillo 1·5–1·8 cm. longo, 1·4–1·5 cm. lato, orbiculato vel suborbiculato, glabro, appendicibus minutis adnatis proviso, clavi c. 3–4 mm. longa; alis 1·1–1·3 cm. longis, 4–5 mm. latis, clavibus c. 3–4 mm. longis; carina

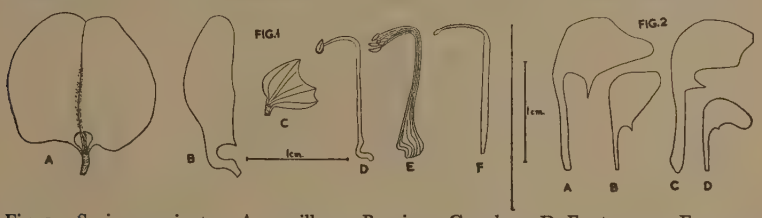

Fig. 1. S. sinuo-carinata. A: vexillum; B: wing; C: calyx; D, E: stamens; F: ovary.
Fig. 2. Keels of S. macrantha A; S. bispinosa B; S. sinuo-carinata C; S. sphaerocarpa D.

1·4–1·6 cm. longa, c. 7–9 mm. lata, flava, nonnunquam maculata, glabra, in parte superiore in angulo recto superne curvata, auricularum apicibus ad carinae apicem vergentibus, clavi c. 7–9 mm. longa. *Stamina* diadelphia, 9 + 1, filamentis c. 1·6–1·8 cm. longis. *Ovarium* glabrum, c. 1·3–1·4 cm. longum, ovalis numerosis provisum, stylo in angulo recto superne flexo, apicem versus piloso, stigmate capitato. *Legumen* ad 28 cm. longum, c. 3–4 mm. latum, leviter curvatum, atri-fuscum, glabrum, suturis prominentibus, apice acuto praeditum. *Semina* ellipsoidea, basi apiceque rotundata, c. 4 mm. longa, c. 1–2 mm. lata, glabra, atri-fusca vel atrata.

Holotype: Gold Coast, Oct. 1953, J. K. Morton A90 (K).

Representative Specimens:

West Tropical Africa: Gambia, Kuntuar, *J. P. Ruxton* 146 (K); Port Guinea, Bissan, Antula, *E. Santo* 2542 (K); Bisseo, *M. Dinklage* 3212 (BM); French Guinea, *M. Pobeguin* 441 (K); French Sudan, Burako, *Olufsen* 38 (BM); Africa Centralis, 1835, *E. Vogel* (BM); Sierra Leone, *Tindall* 46 (K); *F. C. Deighton* 5401 (K); 2251 (K); Kano Dist., *D. Small* 402 (K); Njala, *F. C. Deighton* 1790 (K; BM); Nigeria, Naraguta & Jos, *H. V. Lely* 586 (K); 534 (K); Kwarre, *H. C. Sampson* 29 (K); Katagum, *Dalziel* 9 (K).

Cameroons: Oubangui, region de Bozoum, *R. P. Tisserant* 3160 (K).

* Part of the thesis submitted for the degree of Ph.D. in the University of London.

Uganda: Serere, *Chandler* 1506 (K).

Angola: Malange, *M. F. Dawe* 392 (K); Loanda, Cazengo, *J. Gossweiler* 4811 (K); *R. G. N. Young* 810 (BM); *Welwitsch* 1994 (BM).

Distribution: West Tropical Africa; Uganda; Angola.

Previously this species was confused with *S. bispinosa* (Jacq.) Wight by Phillip & Hutchinson (1921), Hutchinson & Dalziel (1928) and Hepper (1958) as is evident by the study of the specimens cited by these workers [i.e. Phillip & Hutchinson (1921): Chevalier 5675; Zenkar & Standt 501. Hutchinson & Dalziel (1928): Elliot 4219; 5220; Dalziel 1227; Phillip 13. Hepper (1958): *S. pachycarpa* of W.T.A. ed. 1, p. 387 (excluding Perottet 230) i.e. Dalziel 9; 615; Lely 534; 586; Dent Young 85.]. *S. bispinosa* (Jacq.) Wight, however, does not extend to West Tropical Africa, Cameroons and Angola; Uganda is the region of overlap between the two species. The differences between the two species are summarised below:

S. bispinosa	*S. sinuo-carinata*
1. Stipules 0·7 cm. or less in length.	2. Stipules 0·7–1·3 cm. in length.
2. The tip of the auricle of the keel points towards the claw (Fig. 2).	3. The tip of the auricle of the keel points towards the tip of the keel and not towards the claw (Fig. 2).
3. Style and stigma glabrous.	4. Style and stigma pilose (Fig. 1).

The attached diagram (Fig. 2) shows the keel of the four species of *Sesbania*. Their comparative study clearly illustrates the fact that the structure of the keel of *S. sinuo-carinata* Ali is quite different from those of *S. macrantha* Welw. ex Phillip & Hutchinson and *S. bispinosa* (Jacq.) Wight. In the curved nature of the keel it resembles with that of *S. sphaerocarpa* Welw. though the two species are quite distinct because of the differences in the shape of the auricle and the size of the keel apart from the strikingly different fruit characters.

Acknowledgements: I beg to express my indebtedness to Mr. P. R. Bell, lecturer in Botany, University College, London, for his kind advice and to Dr. G. Taylor, Director, Royal Botanic Gardens, Kew, for various facilities and personal interest and encouragement. To the authorities of the following herbaria I am obliged for herbarium and library facilities: Royal Botanic Gardens, Kew; British Museum (Natural History), London; Royal Botanic Gardens, Edinburgh; Museum National d'Histoire Naturelle, Laboratoire de Phanerogamie, Paris and Conservatoire et Jardin botaniques, Geneva. I am thankful to Dr. H. Huber for kindly translating the description into Latin.

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Sabicea Aubl. and Stipularia Beauv. (Rubiaceae-Mussaendeae) in Tropical Africa

F. N. Hepper

Hitherto the small African genus *Stipularia* Beauv. has been recognised as distinct from *Sabicea* Aubl. on account of its large involucral cups. The type of the genus *Stipularia* is *S. africana* Beauv. and possesses large stipules which presumably suggested the generic name to Palisot de Beauvois. Subconsciously, therefore, I expect many botanists think that all species of the genus must also possess large stipules. However, of the species so far described most have quite small stipules, as in *Stipularia elliptica* Schweinf. ex Hiern, and incidentally several species of *Sabicea* have stipules as large as, or larger than, *Stipularia africana*.

Wernham in his Monograph of Sabicea (1914) states (on p. 10) that the principal point of difference between *Sabicea* and *Stipularia* is that the inflorescence of the latter is *enclosed* in a campanulate involucre, whilst the bracts of *Sabicea* are free or almost so. The other characters he uses to distinguish between the genera are the number of loculi in the ovary and the size of the fruit, but the ovaries of *Stipularia* are *not* 2-celled, as he stated, and fruit-size is of no significance.

In the course of revising the *Mussaendeae* for the Flora of West Tropical Africa I have been interested to follow the variation in shape, size and coherence of the bracts in these two genera and conclude that there is no point at which it is possible to divide satisfactorily between *Stipularia* and *Sabicea*. As the earlier name is *Sabicea* it fortunately means the transference of only a few species from *Stipularia* to *Sabicea*. There are also two species for which I am making new combinations that I consider were described in the wrong genus, even on the old basis of division, as the two large bracts are quite free.

Sabicea, therefore, exhibits to a remarkable degree the variation that can take place in bract development and I list below the sequence from virtual absence, to large and free, to partial fusion, to complete fusion. In doing so I am not implying in any way that is how I consider the bract-development to have evolved but I am merely taking examples which best exhibit the sequence, and the order of the species is not a phylogenetic one.

Sabicea rosea Hoyle and *S. speciosa* K. Schum. ... ... bracts virtually absent.

↓

S. venosa Benth. ... ... bracts small, often more or less reflexed and inconspicuous.

↓

S. capitellata Benth. ... ... bracts forming a distinct involucre, free.

↓

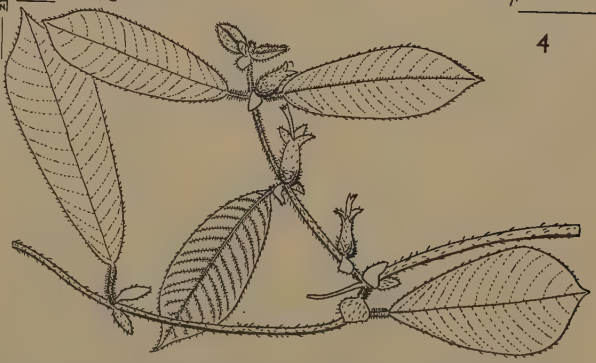

FIG. 1. *Sabicea liberica* Hepper; drawn from *Linder* 1380; × ⅓.
FIG. 3. *Sabicea harleyae* Hepper; drawn from *Harley* 1167; × ⅓.

FIG. 2. *Sabicea adamsii* Hepper; drawn from *Adams* 2967; × ⅓.
FIG. 4. *Sabicea urceolata* Hepper; drawn from *Onochie* FHI 36325; × ⅓.

S. brevipes Wernham ... ... bracts conspicuous as an involucre.

↓

S. dewevrei De Wild. & Th. Dur. ... bracts fused at base to nearly half their length forming an open cup.

↓

S. cordata Hutch. et Dalz. ... ... bracts fused into a close-fitting campanulate cup round the calyx of the solitary flower.

↓

S. urceolata Hepper ... ... campanulate cup with several flowers.

↓

S. africana (Beauv.) Hepper ... bracts fused into a large campanulate involucre surrounding the inflorescence.

Of the species cited above perhaps *S. dewevrei* is the most interesting intermediate between the entirely free bracts of typical *Sabicea* and the totally fused bracts of typical *Stipularia*. I had wondered whether it would be possible to keep *Stipularia* separate on the single, very limited concept of the involucre being distinctly urceolate, but this seems to be merely a matter of degree which is unlikely to be satisfactory. *S. urceolata* Hepper, described below, has a perfect urceolate involucre, though small, and links up with the larger involucres found in *Stipularia* and would have been described in that genus if it were maintained.

New species, new combinations and a new name in *Sabicea*:

Sabicea adamsii *Hepper* sp. nov.; species incertae sedis; habitu tenuiter herbacea stolonifera distinguenda. (Fig. 2).

Herba stolonifera. *Caules* erecti ad 5 cm. alti; stolones subterranei tenue radiciferi, stolones supra terranei tenues radiciferi, stolones supra terranei tenues pilosi ad 15 cm. longi. *Folia* elliptica apice et basi acuta, 5–7 × 2·5–4 cm., nervis lateralibus utrinque 5–6, utrinque molliter adpresso-pubescentia margine molliter patentim pubescentia; folia juniora alba (haud lanuginosa vel araneosa); foliorum superiorum petiolo brevi, inferiorum ad 2·5 cm. longo; internodiis compressis; stipulis ovatis apice acutis, 6 × 8 mm. membranaceis, fuscis, villosis, costis dense villosis. *Flores* axillares solitarii; bracteolis linearibus c. 3 mm. longis; corolla non visa, secus collectorem alba; calycis lobis lineari-lanceolatis c. 3 mm. longis, villosis. *Bacca* coccinea, polysperma.

GHANA: W. Ashanti, Mpameso Forest Reserve, 23 Dec. 1954, *C. D. Adams* 2967: low stoloniferous herb, flowers white, berry scarlet (holotype K).

This is a very distinct species and is characterised by the long slender stolons and herbaceous habit. I have been quite unable to find any closely related species of *Sabicea*, but I feel sure it belongs to that genus. There are several prostrate species of *Sabicea* (e.g. *S. medusula* K. Schum. and *S. geophiloides* Wernham) but these have woody stems which root at the nodes and do not have definite stolons, so they can hardly be compared with *S. adamsii*. Its habit seems to be well adapted to the environment of the forest floor amongst fallen leaves.

Sabicea africana (*Beauv.*) *Hepper* comb. nov.

Stipularia africana Beauv. Fl. Ow. **2.** 26, t. 75 (1807).

Type: S. Nigeria, *P. de Beauvois* (holotype G).

This is the type species of the genus *Stipularia* Beauv.

Sabicea efulenensis (*Hutch.*) *Hepper* comb. nov.

Stipularia efulenensis Hutch. in Kew Bull. **1908.** 291.

Sabicea tchapensis K. Krause in Engl. Bot. Jahrb. **48.** 408 (1912), and var. *glabrescens* Wernham, Monogr. Sabicea 49 (1914).

Type: French Cameroons: Efulen, *Bates* 439 (holotype K!).

I consider this is a *Sabicea*, even on the old concept of the genus *Stipularia*, because the bracts are quite free. I have seen a photograph at the British Museum of *Ledermann* 2655, the type of *S. tchapensis* K. Krause which was destroyed in Berlin, and a specimen of the variety: both must be considered as synonyms of *S. efulenensis*.

Sabicea elliptica (*Schweinf. ex Hiern*) *Hepper* comb. nov.

Stipularia elliptica Schweinf. ex Hiern in F.T.A. **3.** 80 (1877).

Type: Sudan Republic, Niamniam-land, *Schweinfurth* 3721 (lectotype K!).

Three specimens were cited by Hiern in F.T.A. and from these I designate *Schweinfurth* 3721 as lectotype.

Sabicea gabonica *Hiern* in F.T.A. **3.** 80 (1877).

Type: Gabon: Gabon R., *Mann* 933 (holotype K!).

This species, like *S. efulenensis* above, is clearly a typical *Sabicea* on account of the free bracts.

Sabicea harleyae *Hepper* sp. nov.; affinis *S. calycinae* Benth. sed pedunculo adpresso-pubescente, calycis lobis angustioribus; affinis *S. vogelii* Benth. sed foliis supra glabra ceterum adpresso-pubescentibus differt. (Fig. 3).

Frutex volubilis tenuis dense adpresso-pilosus. *Folia* ovata, apice acuminata, basi rotundata vel subacuta, 5–8 × 3–6 cm., supra glabra (costa sola basi pubescente), subtus aequaliter adpresso-pubescentia, margine pubescente, costis lateralibus utrinque 6–9, subtus dense pubescentia, stipulis ovato-lanceolatis c. 7 × 4 mm., adpresso-pubescentibus. *Inflorescentiae* capitula c. 3 cm. diametro, multiflora, pedunculo 4–8 cm. longo, adpresso-pubescente; bracteis linearibus inconspicuis; calycis tubo 4 mm. longo, lobis linearibus 10 mm. longis 1 mm. latis; corollae tubo 13 mm. longo extra pubescente, lobis 2 mm. longis, pubescentibus; stigmate bilobo; antheris 3 mm. longis.

Liberia: Ganta, roadside vine, fl. 13 May 1939, *Harley* 1167: flower white; calyx and bracts pink-brown; Mano name *Yei fua gon* (holotype K). Same locality, fl. 29 Apr. 1932, *Harley* s.n.

The leaves glabrous on the upper surfaces seem to be characteristic of this species and separate it from related species with which it could be confused. However, I have seen one specimen at Kew of *S. vogelii* from Sierra Leone with leaves glabrous on the upper surface which is very unusual. Even so

the appressed pubescence of our new species contrasts with the spreading pilosity of *S. vogelii*, which also has long hairs along the midrib above. Both the specimens were collected by Dr. and Mrs. G. W. Harley who have been interested in Liberian plants for nearly 30 years and I have pleasure in naming the present species after Mrs. W. J. Harley who has collected several hundred specimens, in particular about Ganta.

Sabicea lanata *Hepper* nom. nov.

Stipularia mollis Wernham in Journ. Bot. **56.** 310 (1918); non *Sabicea mollis* K. Schum. ex Wernham (1914).

Type: Belgian Congo: Boyeka, *Nannan* 62 (syntype K?).

I am somewhat doubtful about the status of this as a species distinct from *S. elliptica*. Wernham in his original description does not differentiate it from any other species in the genus. The leaves are much more pilose, especially along the midrib and lateral nerves, than in *S. elliptica* and this character is to be seen in the other two Belgian Congo specimens (named *S. elliptica*) at Kew. Also the involucral bracts are more pilose and less woolly than in the types of *S. elliptica*.

Sabicea liberica *Hepper* sp. nov.; affinis *S. cordatae* Hutch. et Dalz. sed calycis lobis laterioribus, foliis cuneatis (haud cordatis); affinis *S. urceolatae* Hepper sed cupula bracteolari minore differt. (Fig. 1).

Frutex volubilis, ramulis tenuibus, junioribus dense ± adpresso-pilosis, senioribus subglabris. *Folia* elliptica, apice acuta, basi cuneata, 8–10 × 3–4·5 cm., utrinque pilosa, nervis subtus dense pilosis; petiolo c. 1 cm. longo; stipulis 5–8 × 2–3 mm. lanceolatis. *Flores* axillares solitarii; bracteae cupuliformiter cohaerentes c. 5 mm. longae; calycis lobis linearibus c. 12 × 2 mm., utrinque ± adpresso-pilosis, ovario densissime piloso; corollae tubo et lobis dense hirsutae, tubo 12 mm. longo, lobis 6 mm. longis, rubris. *Bacca* rubens; semina angularia.

Liberia: Moala, fl. 4 Nov. 1926, *Linder* 1380: climbing vine; corolla reddish; fruit red (holotype K). E. Prov.; Tchien Dist., Bahtown on Cess River, 11 Aug. 1947, *Baldwin* 8030: procumbent; with red fruit.

This is a distinct species which was not described for the first edition of the Flora of West Tropical Africa and the single sheet, *Linder* 1380, has now been joined by another specimen, this time in fruit. However, *Linder* 1380 has only one flower and I thought it imprudent to dissect it, especially as little is to be gained from floral characters in this particular genus. The field note describing Baldwin's specimen as 'procumbent' is, I think, misleading and *S. liberica* cannot be likened to, say, *S. geophiloides* Wernham, which is truly prostrate and roots at the nodes.

Sabicea urceolata *Hepper* sp. nov.; affinis *S. cordatae* Hutch. et Dalz. sed involucro multo majore, floribus 2 vel 3, foliis basi rotundatis differt. (Fig. 4).

Frutex volubilis ramulis tenuibus fuscis pilosis, junioribus viridibus. *Folia* oblanceolata vel obovata vel late elliptica, apice acuto-acuminata, basi rotundata vel subacuta, 7–11 × 3–5 cm., utrinque hispido-pilosa, nervis lateralibus utrinque 15 arcuata; petiolo 5–15 mm. longa, densissime piloso;

stipulis ovatis, 8–10 × 8 mm., reflexis. *Flores* axillares 2 vel 3 in quaque axilla intra involucrum, sessiles; involucrum urceoliforme 1–1·5 cm. longum, rubens, hispido-pilosum, sessile, apice lobis inaequalibus 2–6 mm. longis; calycis tubo c. 2·5 mm. longo pubescente, lobis inaequalibus c. 1 mm. longis; corollae tubo c. 2·5 cm. longo, glabro, lobis 2 mm. longis pubescentibus, albis. *Fructus* ignotus.

W. NIGERIA: Benin Prov., Okomu Forest Reserve, in a patch of abandoned farmland on a slope not far from a stream, fl. 14 Feb. 1948, *Brenan* 9032: slender climber to c. 1·3 m. high, young stems green, older brown; leaves papery, deep green and not glossy above, midrib and lateral nerves slightly impressed, pale green beneath with prominent midrib and lateral nerves; bracts green, apparently enclosing a single bud. (K).

E. NIGERIA: Calabar Prov., Oban Forest Reserve, Orem, at about mile 66 on the Calabar to Mamfe road; climber tangle in break-up gap, fl. 7 Feb. 1957, *Onochie* FHI 36325: climbing plant with dark stems and pale green branchlets; calyx [= bracts] green with dark red tips; corolla in bud white (holotype K).

FERNANDO PO: Musola, fl. 9 Jan. 1947, *Emilio Guinea* 1053 (K).

I would like to record my thanks to Mr. H. K. Airy Shaw for his kind assistance with the above Latin descriptions.

Flora of San Francisco.*—This is a valuable catalogue, in taxonomic order of families, but without descriptions or keys, of the flora of the city and county of San Francisco. 1055 species are recognized, including a very large number of naturalised adventives and 6 endemics, two of which occur on serpentine outcrops. The nomenclature of the catalogue is evidently of the highest standard. British botanists will be surprised to see that *Eriophorum gracile* once grew so far south as this, and Clapham, Tutin and Warburg may note that *Helxine soleirolii* is here called Baby's Tears. The excellent short introduction has a melancholy pre-mortem interest, with its careful description and illustrations of vegetation now being rapidly destroyed by post-war industrial developments and housing plans.

N.Y.S.

* A Flora of San Francisco, California, by John Thomas Howell, Peter H. Raven and Peter Rubtzoff, reprinted from The Waxmann Journal of Biology, vol. 16, no. 1, spring 1958. The University of San Francisco, San Francisco, California, 1958. 157 pages + 20 figs. and 1 map. $3.00.

Additions to the Wild Fauna and Flora of the Royal Botanic Gardens, Kew: XXII*

(Edited by H. K. Airy Shaw)

THE THYSANOPTERA OF KEW GARDENS

Guy D. Morison
(North of Scotland College of Agriculture, Marischal College, Aberdeen).

[We are greatly indebted to Dr. Morison for putting together his notes on Kew 'thrips' in the form of this useful paper. It is to be hoped that it may stimulate others to study this neglected, but often economically important, group of insects.—H.K.A.S.]

'Thrips' is the common name generally applied to the order Thysanoptera. When used in a popular manner it may be written with a small 't', but it should end with a single 's' whether in singular or plural, as it is a Latin name derived from the Greek θρίψ. The first described genus of Thysanoptera is *Thrips*.

Previous Records

Mention may first be made of an early reference to thrips—though not in the Gardens—in the first volume of the Kew *Bulletin*. In a paper entitled 'Onion Disease at Bermuda', A. E. Shipley (1887, *Bull. Misc. Inf.*, Kew, **1887,** no. 10, pp. 18, 19) wrote that adults and larvae of a small species of thrips (unnamed) occurred on onion plants in Bermuda and might be cause of serious loss. He suggested control of the pest by spraying attacked plants with iron sulphate solution. Pergande (1895, *Insect Life*, **7,** 392) considered that Shipley's species was the Onion Thrips, *Thrips tabaci* Lindeman 1888. Uzel (1895, *Monogr. Ordn. Thysan.* 380, 446) refers to Shipley and (p. 458) to Pergande, but he considered that his own *T. communis* sp. n. (1895) was perhaps not *tabaci*. Hinds (1902, *Proc. U.S. Nat. Mus.* **26,** 179, 227) did not see Shipley's paper, but included it in references to *tabaci*; Bagnall (1909, *J. Econ. Biol.* **4,** 33) writes that *T. tabaci* Lind. (= *communis* Uzel) is the species recorded by Shipley. The *Zoological Record* makes no mention of Shipley's paper.

The only paper on the Thysanoptera of Kew Gardens is that of R. S. Bagnall (1909, *Bull. Misc. Inf.*, Kew, **1909,** 254–255), in which five species are recorded from hothouses; of these, four breed only in hothouses in Britain, whilst the fifth, *T. tabaci*, breeds also in the open and is recorded below. This paper, like that of Shipley, is not mentioned in the *Zoological Record*, and seems to be unknown to specialists in Thysanoptera. Bagnall remarks: 'none [were collected] from the Gardens proper, though it is practically certain that the wild thrips-fauna will be a comparatively large one'. After stating that the houses were practically free from thrips, he suggests that various species of ants, which were then numerous in the

* Continued from *K.B.* **1952,** 288.

houses, help to reduce the numbers of thrips. Bagnall repeats the records from Kew in the *J. Econ. Biol.* **4,** 33, and also in 1909, *Ent. mon. Mag.*, **45,** 33–34, without naming the *Kew Bulletin*.

Having obtained a permit from the authorities of Kew Gardens in 1923 to look for thrips in the glasshouses, I attempted the task on various occasions but did not find a specimen. At the time I had not read Bagnall's paper on Kew Thrips, but I concluded that the frequent spraying of the plants with water reduced the multiplication of thrips and that the number was probably further checked by some species of the numerous ants.

During eleven visits to the Gardens, 1923–1948, I found on plants in the open the 23 species listed below. Adding to these Bagnall's 4 hothouse species, *Heliothrips haemorrhoidalis* (Bouché), *Hercinothrips femoralis* (Reuter), *Parthenothrips dracaenae* (Heeger) and *Neophysopus orchidaceus* (Bagnall), the total is 27. The Gardens probably harbour 40–50 species.

Bionomics

To help in understanding some of the factors involved in the bionomics and habits of the species found in the Gardens, the following notes are appended.

The mouth-parts of the thrips abrade and pierce living tissue, from which the insect sucks juices and removes minute portions of matter (plastids, pollen, fungus spores). Most species live on plant juices, and many on the spores of fungi, while some are predacious, sucking juices from small insects or mites, though they will probably also imbibe plant juices. These three types of feeders occur in the Gardens.

The life-history of each species is linked with the leafing, flowering, fruiting or sporulating cycle of one or more species of plants, even in the case of the more or less predacious species. A species may breed on one species of plant only, another may breed on members of a single genus or of closely allied genera, whilst others breed on several species belonging to different families and groups, e.g. *T. tabaci* larval hosts include *Matricaria*, *Opuntia*, and *Allium*.

The term 'host-plant' is applied to the plant which serves to rear the larvae of a species of thrips, and 'finding-place' to where the insect was found, *e.g.* leaf of oak, dandelion inflorescence, dead branch of alder, window pane. If a plant be the finding-place, it is not necessarily a host-plant of the larva, or even one from which a larva or adult has sucked some juice, because adults and larvae of certain species occur on many objects besides the host-plants. The 'locality' is the geographical site where the insect was found.

Viviparity has not been proved for any British Thysanoptera. Females lay eggs. In the *Terebrantia* the egg-shell is delicate and the egg is inserted into a slit made by the ovipositor in the soft tissue of a plant, whilst in the *Tubulifera*, which lack an ovipositor, the hard-shelled egg is laid on a sheltered portion of a leaf, between parts of flowers or in a crevice near fungus. It is convenient to call immature feeding-stages 'larvae', and, as there are two instars, the first is referred to as 'I' and the second as 'II'. In the *Terebrantia* there is a prepupal (pp) and a pupal (p) stage, whilst in the *Tubulifera* there is one prepupal (pp) and two pupal (p I, p II) stages.

Females are generally more numerous than males, because in some species males are absent, in others they are rare, and in others, whilst both sexes occur in about equal numbers during the breeding period, the males usually die before winter and females hibernate. Females are larger than males; the females of the species recorded from Kew vary in length between 0·8 and 2·4 mm. Both sexes of some species are capable of jumping about 1 cm. high. Many winged species will fly readily in warm surroundings. Number of generations in the year depends on the species, temperature and humidity. Some species normally have one, others two generations annually, but *T. tabaci* breeding parthenogenetically in a hothouse may have 12 generations in the year. Overlapping occurs between generations. Longevity ranges from 1 to 12 months, from new-laid egg to death of adult female after completion of oviposition, depending on species and conditions. Depending on the species, winter is passed by the adult female, female and male, or any combination of adults, eggs, larvae and pupae.

Large numbers of thrips may be seen on a plant. The reasons for the abundance have to be investigated for each plant, and this often means the collection, classification and counting of the insects of all stages and then consideration of the bionomics and habits of the species represented and factors of the habitat and locality. The explanation for the number may be fairly simple when a single species is found breeding on its host-plant, but it is more complicated when 50 thrips of 6 species occur in the capitulum of a dandelion. In the Gardens a dozen (of 2–3 species) may be seen on a large flower of *Clematis*, and some hundreds (of 5–7 species) on flowers of a clump of certain species of *Senecio* or *Solidago*. The numbers on the dandelion in spring may include ♀♀ of 1–6 spp., and ♂♂ of 1–2 of these spp., but only 3 out of the 6 spp. are likely to breed on the plant; the others are visitors. In autumn the dandelion population may include larvae of the breeding spp., more spp. ♂♂ and migrating ♀♀ of other spp. The large numbers on flowers in summer and autumn are chiefly Thripids of 1–8 spp., and their gregariousness seems due to various causes, such as the needs for fecundation, food, oviposition, shelter or a temporary resting-place. With the Thripids may occur a few more or less predacious *Aeolothrips*.

Studies on the reasons for the attractiveness of different species of plants to thrips could be pursued admirably in the Gardens, somewhat upon the lines of *Plants and Beekeeping* by F. N. Howes (1945; London: Faber & Faber). During 1923 I noticed that the flowers of *Oenothera biennis* were frequented by large numbers of winged Thripids, both in the Gardens and in a wild garden in Barnes. Following the annual increase and decrease of adults, the numbers on the flowers rose gradually during summer and early autumn, and fell rather suddenly in late autumn; no thrips were seen on *Oenothera* flowers in the Gardens on 2.10.23. Some plants, such as *Doronicum pardalianches* and species of *Impatiens* and *Mimulus*, do not attract thrips, whilst others, e.g. *Sinapis arvensis*, *Achillea millefolium*, *Pyrethrum cinerariifolium*, attract many species. Within the genera *Delphinium*, *Senecio*, *Solidago*, cultivated at Kew, some species are more favoured than others. Species of *Rhododendron* are rarely visited by thrips, though *Taeniothrips vulgatissimus* will breed in the flowers of *Rh. ponticum* in Aberdeenshire. On species in the Gardens I noticed hundreds of small flies, and even a ♀ Blowfly, *Calliphora vomitoria* (L.), dying or dead through their legs having become stuck to the

petioles of the flowers or to the bracts by the secretion from the glands of these parts. No thrips were seen entangled by the secretion of these plants, or that of *Martynia lutea*, which also ensnared many small Diptera.

List of Species

The arrangement of species follows the list of Morison (1947, '48, '49, Thysanoptera of the London Area: *Lond. Nat.*, *Supplement*, pp. 131, 34 figs.), with slight alterations to conform with recent advances in knowledge. It differs little from that of Kloet and Hincks (1945, *Check List of British Insects*, pp. 32–36; Stockport: authors) and of Priesner (1926, '27, '28, *Thysan. Europas*, 755 pp., fig.s; Wien: Wagner). The common names are from the Association of Applied Biologists' list of *Common Names of British Insect and other Pests*, **2**, 6–7 (1952; Rothamsted Experim. Sta., Harpenden, Herts.). The names of plants are those of Clapham, Tutin and Warburg (1952, *Flora of the British Isles*, 1591 pp., figs.; Cambridge University Press), except for names which were copied from labels on plants in the Gardens.

THYSANOPTERA

TEREBRANTIA

Aeolothripidae

Aeolothrips fasciatus (*L.*). 1 ♀ *Solidago nemoralis*, few ♀♀ *Delphinium truncatum*, 21.8.23; 2 ♀♀, 1 ♂ *Verbascum thapsus*, 1 ♀ *Rubus fruticosus* (agg.) 1 ♀, 1 ♂ *Hypochoeris radicata*, 5.7.30; 1 ♀ herbage, 23.8.38; 1 ♀ *Chenopodium album*, 1 ♀ *Solanum nigrum*, 1 I, 1 II *Stellaria media*, 24.8.46; 1 ♂, 2 II clover, 29.7.48. The larvae may be confused with those of *tenuicornis*, since it is impossible to separate the two species on larval characters. Both species occur on many different spp. of plants. Larvae more or less predacious on small Arthropoda. Full grown larva II pupates within a silken cocoon amongst débris on the soil.

Ae. tenuicornis *Bagn.* 1 ♀ *Hypochoeris radicata*, 1 ♀, 1 ♂ *Verbascum thapsus*, 3.7.30; 1 ♀ *Verbascum thapsus*, 29.7.48.

Thripidae

Chirothrips manicatus *Hal.* 3 ♀♀, 1 ♂ grass, 5.7.30; 3 ♀♀, 9 ♂♂ grass, 23.8.38; 2 ♀♀, 3 ♂♂ *Holcus lanatus*, grass, 24.8.46. Breeds on certain spp. grass. Larvae broad and flat, very difficult to find, living between leaf-sheath and stems. Adults abundant.

Limothrips cerealium *Hal.* 'Grain Thrips'. 1 ♀ *Glyceria maxima*, 2 ♀♀ grass, 5.7.30; 1 ♀ *Euphorbia peplus*, 8 ♀♀, 7 ♂♂, 1 II *Anisantha sterilis*, grass, 24.8.46; 2 ♀♀, 4 ♂♂, 2 II grass, 29.7.48. Breeds on cereals and certain spp. grass, females migrating in vast numbers when corn is ripe.

Limothrips denticornis *Hal.* 1 ♀ grass, 24.8.46. Habits like those of *cerealium*, but breeds chiefly on barley.

Aptinothrips rufus (*Gmelin*). 'Grass Thrips'. 5 ♀♀, 2 II grass, 5.7.30; 9 ♀♀ grass, 23. 8.38; ♀♀, II *Holcus lanatus*, grass, *Anisantha sterilis*, 24.8.46.

Breeds on *Gramineae* throughout the year, usually parthenogenetic; almost cosmopolitan distribution, though wingless.

Odontothrips ulicis (*Hal.*). Many ♀♀ on flowering *Ulex europaeus*, 20.4.23. Common in Britain on hosts, *Ulex* spp.

Taeniothrips atratus (*Hal.*). 'Carnation Thrips'. ♀♀, ♂♂ *Oenothera biennis*, 21.8.23; few ♀♀ inside fallen flowers *Hibiscus* sp., but not in flowers on the bush, 2.10.23; 1 ♀ *Stellaria* sp., 5.7.30; 8 ♀♀, 5 ♂♂ *Stellaria media*, 23.8.38; 11 ♀♀, 10 ♂♂, 15 II *S. media*, 3 ♀♀, 1 ♂ *Urtica dioica*, 4 ♀♀ *Chenopodium album*, 2 ♀♀, 10 ♂♂ *Solanum nigrum*, 25 ♂♂ *Achillea millefolium*, 1 ♀, 2 ♂♂ *Papaver rhoeas*, 24.8.46. Common to abundant in British Isles. I have found it on more than 200 spp. flowering plants. Hosts include many spp. *Caryophyllaceae*, *Myosotis*, and a few spp. in other families.

Taeniothrips vulgatissimus (*Hal.*). 1 ♂ *Delphinium truncatum*, 21.8.23; 1 ♀ *Verbascum thapsus*, 1 ♀ *Rubus fruticosus*, 5.7.30; 1 ♀ herbage, 29.7.48. Hosts are many spp. *Umbelliferae*, *Cruciferae*, *Rosaceae*, *Salicaceae*, and a smaller number of spp. in some other families. The species is abundant in Scotland from Caithness to Kirkcudbrightshire, with both sexes occurring in about equal numbers and no apparent parthenogenesis. It seems less abundant in the northern half of England, where males seem scarcer than females. In the southern half of England females are fairly common, males seem absent or rare.

In England the most numerous thrips on flowers are both sexes of *Thrips fuscipennis*, *major*, and *flavus*. In Scotland both sexes of *Taeniothrips atratus* and *vulgatissimus* are the commonest thrips on flowers, with *Thrips fuscipennis* disappearing almost completely north of the southern half of Kincardineshire, *major* disappearing at about Midlothian, and *flavus* extending to Caithness and Sutherland but greatly reduced in numbers compared with populations in England.

Thrips physapus *L.* 8 ♀♀ *Hypochoeris radicata*, 5.7.30; 1 ♀ *Taraxacum officinale*, 23.8.39; 1 ♀, 1 ♂ *Crepis capillaris*, 24.8.46. It has been confused with *hukkineni*. The larvae have not been described. It probably breeds on *Taraxacum officinale* and certain other *Compositae*. Often associated with *hukkineni* and *validus*, but scarcer than either species. Seems fairly common in England. No valid record for Scotland.

Thrips hukkineni *Priesner*. 2 ♀♀ *Hypochoeris radicata*, 5.7.30; 1 ♀, 3 ♂♂ *Taraxacum officinale*, 23.8.38. Breeds on *Taraxacum*, *Hypochoeris* and a few other *Compositae*. Widely spread and quite common in Great Britain and N. Ireland.

Thrips validus *Uzel*. 4 ♀♀ *Taraxacum officinale*, 20.4.23, on two heads of different plants close to one another; a total of 80 capitula were examined in different parts of the Gardens, 20.4.23; 11 ♀♀, 1 ♂, 1 I, 4 II *Hypochoeris radicata*, 1 ♂ *Quercus robur*, 5.7.30; 4 ♀♀, 2 ♂♂, 2 I, 14 II *Crepis capillaris*, 24.8.46. Hosts include *Crepis*, *Hieracium*, *Hypochoeris*, *Lapsana*, *Taraxacum*. Common and widely distributed in the British Isles. Haliday in 1836 did not distinguish the three species. He described the larva of *validus* as that of *physapus*.

Thrips fuscipennis *Hal.* 'Rose Thrips'. Few ♀♀ *Rhododendron smithii-album*, 20.4.23; ♀♀, ♂♂ *Delphinium truncatum, Helianthus annuus, Solidago nemoralis, ohioensis*, 21.8.23; ∝ ♀♀, ∝ ♂♂ *Clematis vitalba* (from England), *potcheri* (Colorado), *C.* sp. *C. flammula* (Europe), *pseudoflammula* (Caucasus), *campaniflora* (Portugal), *integrifolia* (S. Europe), *hendersoni* (garden origin), *viticella* (Europe), *intermedia, aethusifolia* var. *latisecta* (Amurland, N. China). Most numerous in flowers bearing pollen, rare in flowers which had shed the pollen or had unripe anthers. About equal numbers in flowers facing up- or down-wards. Introduced spp. *Clematis* had 5–10 adults (including *major* and *flavus*) per flower like the indigenous *vitalba*. Colour of flowers seemed not to affect the numbers of thrips. Only 1 ♂ seen in *C. durandii* var. *pallida*, and no thrips on *orientalis* (Orient), 24.8.23. 1 ♀, ∝ ♂♂ Umbellifer sp., Compositae, 12.9.25; 7 ♀♀ *Philadelphus*, 19.6.26; ♀♀, ♂♂ *Verbascum thapsus, Hypericum* sp., *Rubus fruticosus*, 5.7.30; 1 ♀, 1 ♂ herbage, 23.8.38; 1 ♀, 1 ♂ *Veronica*, 10 ♀♀, 16 ♂♂ *Euphorbia peplus*, 2 ♀♀ *Cardamine flexuosa*, 3 ♂♂ *Urtica dioica*, 11 ♀♀, 14♂♂, 1 II *Chenopodium album*, 7 ♀♀, 21 ♂♂ *Solanum nigrum*, 2 ♀♀, 38 ♂♂ *Achillea millefolium*, 1 ♀ *Papaver rhoeas*, 2 ♀♀ *Lycopus europaeus*, 2 ♀♀, 2 ♂♂, 2 II herbage, 24.8.46; 1 ♀ *Verbascum thapsus*, 29.7.48. Host plants are many spp. in different families of Angiosperms. Owing to the lateness of the date of most of my collections I missed the larvae.

Thrips major *Uzel.* 'Rubus Thrips'. With *fuscipennis*, few ♀♀, 20.4.23, ♀♀, ♂♂, 21.8.23, ∝ ♀♀, ∝ ♂♂, 24.8.23; ♂♂ Umbellifer sp., Compositae, 12.9.25; ♀♀, ♂♂ *Verbascum thapsus, Rubus fruticosus*, 1 ♀, 1♂ *Quercus robur*, 3 ♀♀ *Stellaria*, 1 ♀ *Hypochoeris radicata*, 5.7.30; 1 ♀, 1 ♂ herbage, 23.8.38; 6 ♀♀, 1 ♂ *Veronica*, 11 ♀♀, 1 ♂ *Chenopodium album*, 7 ♀♀, 11 ♂♂, 1 II *Solanum nigrum*, 8 ♀♀, 12 ♂♂ *Achillea millefolium*, 1 ♀ herbage, 24.8.46; 2 ♀♀, 1 ♂ *Achillea millefolium*, 29.7.48. Host-plants many spp. in different families of Dicotyledons.

Thrips tabaci *Lindeman.* 'Onion Thrips'. ♀♀ *Solidago nemoralis, ohioensis*, 21.8.23; 1 ♀ *Stellaria*, 5.7.30; 1 ♀ herbage, 23.8.38; 2 ♀♀ *Veronica*, 1 ♀ *Urtica dioica*, 3 ♀♀ *Chenopodium album*, 1 ♀ *Senecio vulgaris*, 24.8.46; 1 ♀ *Digitalis purpurea*, 6 ♀♀ *Achillea millefolium*, 29.7.48. Associated essentially with certain Compositae, *Achillea, Senecio, Solidago*, but will breed also on several spp. in other families of Angiosperms. Usually parthenogenetic, almost cosmopolitan, often economically important to crops, spreads certain virus diseases of plants.

Thrips flavus *Schrank.* 'Honeysuckle Thrips'. ♀♀, ♂♂ *Helianthus annuus, Oenothera biennis*, 21.8.23; few ♀♀, ♂♂ *Clematis* spp., 24.8.23; 3 ♀♀, 2 ♂♂ *Calluna vulgaris*, 22.9.28; 1 ♀, 2 ♂♂ *Verbascum thapsus*, 8♂♂ *Rubus fruticosus, Hypericum*, 5.7.30; 1 ♀, 1 ♂ *Veronica*, 1 ♀ *Chenopodium album*, 5 ♀♀ *Solanum nigrum*, 1 ♀ *Achillea millefolium*, 24.8.46; 2 ♀♀ *Verbascum thapsus*, 1 ♀ clover, 29.7.48. Hosts include *Lonicera, Geum, Malva, Ulex, Senecio, Verbascum*.

Baliothrips dispar (*Hal.*). 2♀♀ macropterous, *Glyceria maxima*, in the stream that flows between the Gardens and the Thames at the corner where the Gardens meet the Old Deer Park, 22.9.28; 2 ♂♂ micropterous, grass in the Gardens, 24.8.46. Breeds on *Phalaris arundinacea*, spp. *Glyceria, Holcus, Agrostis*, usually in wet places. Widely distributed, locally common.

Frankliniella intonsa (*Trybom*).'Flower Thrips'. 1 ♀ Umbellifer sp., 12.9.25; 1 ♀ herbage, 23.8.38. Chief hosts are certain Dicotyledons in marshes, e.g. *Erica tetralix*, *Pedicularis sylvatica*, but it will breed on rose, *Ononis* and other plants on dry ground. More numerous in the south than in the north of Brita in.

Parafrankliniella verbasci *Priesner*. 1 ♂, 5.7.30, 1 ♀, 29.7.48, *Verbascum thapsus*, the host-plant. Probably fairly common on wild *Verbascum* in England.

Euchaetothrips kroli (*Schille*). ♀♀, ♂♂, immature instars, 7.9.26, and, with *Baliothrips dispar*, 22.9.28, on *Glyceria maxima*, the host. 5 ♀♀, *Glyceria maxima*, Gardens, 5.7.30. Apparently more numerous in the south than in the north of England.

TUBULIFERA

PHLAEOTHRIPIDAE

Cryptothrips flavipes (*Reuter*). 1♂, micropterous, under Basidiomycete, *Stereum rugosum*, 24.8.46, on a stake of hazel (?) used to support plants in a bed, is perhaps this species. There is no other record of an insect like this from Britain. The species probably feeds on spores of certain fungi.

Haplothrips subtilissimus (*Hal.*). 1 I *Quercus robur*, 5.7.30. Larvae creamy white, banded crimson; walk rapidly, predacious on small Arthropoda. Sometimes quite numerous on oak and apple in the southern half of England.

[**Haplothrips setiger** *Priesner*. 2 ♀♀ *Senecio aquaticus*, on bank of Thames near Kew Palace, 29.7.48, and likely to occur in the Gardens themselves since it became abundant in the City and other parts of London with the spread of *Senecio squalidus*, *Erigeron canadensis* and other plants as a result of the last war.]

Bush Peaches.*—This attractively produced work in which he gives the results of his practical experiences on perhaps the most luscious of temperate fruits, the Peach, is by an East Anglian fruit farmer, who deals specifically with bush varieties which may be cultivated in the open in parts of the British Isles. There are chapters on its history, structure, cultivation, management, pests and diseases, climatic requirements improvement and varieties, the whole rounded off with a bibliography and index.

* Bush Peaches, by C. P. H. Wilson, pp. 140. 1952. W. H. & L. Collingridge Ltd., London. price 42/-.

Nomenclatural Notes: X*

On the application of the name Vincetoxicum.

A. A. Bullock

The generic name *Vincetoxicum* (*Asclepiadaceae*) first appeared in a memoir by Medicus entitled 'Ueber den gynandrischen Situs der Staubfäden und Pistille einiger Pflanzen' published at Munich in 1787.** The memoir was republished in Hist. Comm. Acad. Theod.-Palat. Mannheim, Phys. 6: 404 (1790) and it is this latter date which has been very generally though wrongly accepted as the date of valid publication of the name.

Vincetoxicum Medicus was based upon the single species *Asclepias vincetoxicum* Linn. and *V. hirundinaria* Medicus is a legitimate name under *Vincetoxicum*. The synonymy of this species has been given in some detail under *Cynanchum vincetoxicum* (Linn.) Pers. by Litardière in Briquet, Prodr. Fl. Corse 3 (2): 61 (1955), which makes clear the fact that the taxonomically correct name of *Asclepias vincetoxicum* Linn. is *V. album* (Miller) Asch. (Fl. Prov. Brandenb. 1: 421. 1864). Also based upon *Asclepias vincetoxicum* Linn. is *V. officinale* Moench (Meth. 717. 1794) but it is evident that Moench adopted the generic name of Medicus and illegitimately changed the specific epithet.

The 1787 publication of *Vincetoxicum* goes some way to explaining why Walter (Fl. Carol. 13, 104. 1788) adopted the name instead of applying '*Anonymos*' to his two new species *V. gonocarpos* and *V. acanthocarpos*. There is no evidence that he intended to describe a new genus, and otherwise extremely difficult to discover why he should have chosen the name *Vincetoxicum*. In any event, since it is agreed that Walter's two species are not congeneric with *V. album*, the generic name *Vincetoxicum* Walter (1788), if it has any real existence, is a later homonym of *Vincetoxicum* Medicus (1787).

The first legitimate generic name to be applied to Walter's two species is *Gonolobus* Michaux (Fl. Bor. Amer. 1: 119. 1803) and it is fortunate that Perry (Rhodora 40: 283. 1938) was able to choose *G. gonocarpos* (Walter) Perry as lectotype of the generic name (see also Index Nom. Gen. 30/04544. 1957).

The association of the name *Vincetoxicum* with an European plant is clearly demonstrated by its history. It was first used as a generic name by Moehring, Hort. Priv. 100 (1736) and again by Ruppel, Fl. Jen. ed. Hall. 25 (1745). Both authors referred to the plant which became *Asclepias vincetoxicum* Linn. (1753). Some authors have regarded *Vincetoxicum* Medicus as a taxonomic synonym of *Cynanchum* Linn., but with this view I cannot agree; *Cynanchum* is a genus of the Old World tropics and subtropics. In either event, however, it is clear that the name *Gonolobus* Michaux cannot be displaced by *Vincetoxicum* Walter.

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*Continued from Kew Bull. 1958: 256. 1958.

**See British Museum (Natural History) Library Catalogue, in a statement attributed to Kayser.

Notes on the genus *Astragalus* Linn. from W. Pakistan and N.W. Himalayas*

S. I. Ali

In this paper an account of the new taxa and notes on some interesting plants belonging to the genus *Astragalus* from W. Pakistan and N.W. Himalayas are presented. It is expected that a complete account of the genus consisting of about 115 species recognised from the area under consideration will be published elsewhere.

The following subdivisions of the area have been recognised: Sind, Baluchanistan, N.W.F. Province, Punjab (East and West), Kashmir, and Kumaun (including Garhwal).

The information about the flowering period of the taxa refers to the plants from the area under consideration and may not be applicable elsewhere.

Classification of the genus:

The subgeneric classification followed is the same as advanced by Bunge (1868, 1869, 1880) and modified by Boissier (1872) and Baker (1876). However, it has not been possible to recognise the subgenera *Trichostylus* Baker and *Trimeniaeus* Bunge. *Trichostylus* is characterised by the style being bearded below the stigma, but intermediate stages between *Trichostylus* and *Pogonophace* are met with in *A. pycnorhizus* Wall. ex Benth. and *A. heydei* Baker. Therefore, *A. hendersonii* Baker, the type species of subgenus *Trichostylus* has been transferred to subgenus *Pogonophace*.

Bunge (1868) differentiated subgenus *Trimeniaeus* from other subgenera having non-penicellate stigmata on the basis of the monocarpic and annual or biennial nature of its representatives—the other subgenera covering the perennial and polycarpic species. Boissier (1872) put the monocarpic species into a distinct series, *Monocarpici* Boiss., divided into two subseries *Epiglottis* and *Trimeniaeus*. Subgenus *Trimeniaeus* was also maintained by Gontscharov et al. (1946), Parsa (1948) and Eig (1955). It is estimated that there are about 170 species at present recognised in this subgenus, and of these only 10 occur in the area under consideration. The problem of the span of life in the genus *Astragalus* has never been studied, and when dealing with the herbarium specimens it is difficult to decide, in the absence of field notes, whether the specimen concerned is a piece of perennial plant or the whole annual plant without roots. Therefore in the absence of distinctive morphological characters that could be used to distinguish subgenus *Trimeniaeus*, it has been thought better to accommodate its representatives under subgenus *Astragalus*.

Subgenus Pogonophace

Astragalus (**Coluteocarpus**) **coluteocarpus** *Boissier*, Diagn. Pl. Or. Nov. Ser. 1, **9**, 65 (1849).

* S. I. Ali, 'Taxonomic Study of *Leguminosae* from W. Pakistan and N.W. Himalayas', Ph.D. thesis, University of London, 1958.

(a) var. **coluteocarpus**

Afghanistan: In regno Cabulico, *Griffith*, 1064, holotype (K); N.W.F. Province: Kurram valley, Karchetal ravine, 9000 ft., *Aitchison* 586 (BM; G; K); Punjab: Upper Kunawar, 9000 ft., 22.8.1847, *Thomson* (K); Upper Kunawar, 10000 ft., 1852, *Thomson* (K); Kashmir: Dras, 11000 ft., *R. R. Stewart* 7473 (K); Rattu above Astor, 9000 ft., *R. R. & I. D. Stewart* 18821 (K).

Distribution: W. Pakistan, N.W.F. Province; Afghanistan; India, E. Punjab.

Flowering Period: June.

(b) var. **glaber** *Ali*, var. nov. a varietate typica foliolis supra glabris differt.

N.W.F. Province: Chitral, below Zapotili, 11480 ft., 23.6.1950, *P. Wendelbo*, holotype (K); Punjab: Mani, Spiti, 11500 ft., *H. A. C. Gill* 2054 (K); Chenab valley, 8000 ft., 1852, *Thomson* (K); Kashmir: Dras, 10000 ft., 25.9.1848, *Thomson* (K); Yarkand Expedition, 1870, *Henderson* (K).

Distribution: W. Pakistan, N.W.F. Province; India, E. Punjab; Kashmir; Russia, Pamir Alai [fide description (Gontscharov, 1946)]; Turkistan.

Flowering Period: June.

Astragalus (**Sesbanella**) **hoffmeisteri** (*Klotzsch*) *Ali*, comb. nov.

Phaca hoffmeisteri Klotzsch in Klotzsch & Garcke, Bot. Ergebn. Reise Waldemar, 159, t. 2 (1862).

Astragalus adesmiaefolius Benth. ex Bunge, Astrag. **1,** 4 (1868); **2,** 2 (1869).

(a) var. **hoffmeisteri**

Punjab: Piti, 1851, *Thomson* (K); Bashahr state, Chango La, 15000 ft., *W. Koelz* 7247 (G); [Himalaya, *Hoffmeister*, holotype (B—not seen)]; Kashmir: Zanskar, 1200 oft., 1852, *Thomson* (K); Tibet occ., 8-12000 ft., *Thomson* (K; BM; E); Baltistan, Shingo valley, 10–11000 ft., 8.7.1892, *Duthie* (BM); Ladakh, Umlung, Karakorum trade route, 12500 ft., *Ludlow* 548 (BM); Ladakh, 11000 ft., 9.7.1848, *Thomson* (K); Zaskar, Tetha, 13000 ft., *W. Koelz* 5637 (G).

Distribution: Kashmir; India, E. Punjab.

Flowering Period: June–August.

(b) var. **pilosus** *Ali*, var. nov. Differt a varietate typica fructibus minute puberulis, ramis junioribus pilosioribus.

Kashmir: Karakorum, 10500 ft., 6.8.1876, *Clarke* 30111A, holotype(K); Baltistan, 1890, *Hunter-Weston* 10201A (K); Baltistan, Hushe Nallah, 9500 ft., *Ludlow* 361 (BM); Baltistan, Khusomik, Thalle pass to Shyok, 9000 ft., *R. R. Stewart* 20784 (RAW).

Distribution: Kashmir.

Flowering Period: June–August.

Astragalus subumbellatus *Klotzsch* and its allies.

Astragalus subumbellatus Klotzsch was described in 1862 from material collected by Hoffmeister in the Himalaya. Bunge (1868, 1869) used the name *A. hippocrepedis* Benth. ex Bunge for plants with 6–10 ovules per ovary, but since he cited *A. subumbellatus* Klotzsch (the type of which he had seen) as a synonym, he rendered the name *A. hippocrepedis* illegitimate. Bunge also described a new species, *A. scorpiurus* Bunge, which has 14–24 ovules per ovary. Boissier (1872) used the name *A. hippocrepedis* in the same sense as Bunge, but he also described *A. camporum* Benth. ex Boiss., which likewise has 6–8 ovules

per ovary, as a species distinct from *A. hippocrepedis*. Baker (1876) used the name *A. subumbellatus* Klotzsch for plants with 20–24 seeds per pod, but under this name he included not only *A. scorpiurus* but also *A. hippocrepedis*. *A. punjabicus* Sirjaev described recently (1951) is the same as *A. scorpiurus* Bunge. Thus we find that *A. subumbellatus* Klotzsch (*A. hippocrepedis* Benth. ex Bunge) has been used in different sense by Bunge and Bossier on one hand and Baker on the other. The type of *A. subumbellatus* Klotzsch has been destroyed in Berlin. The figure of the specimen published with the original description does not show the mature pods. However as the observation of Bunge was based on the type-specimen (which he cited) it seems reasonable to adopt the name *A. subumbellatus* Klotzsch for the plant with 6–8 ovules per ovary and the interpretation of Baker must be rejected. The correct name for plants with 14–24 ovules per ovary, appears to be *A. scorpiurus* Bunge.

Astragalus (**Falcinellus**) **subumbellatus** *Klotzsch* in Klotzsch & Garcke, Bot. Ergebn. Reise Waldemar, 159, t. 3 (1862).

A. hippocrepedis Benth. ex Bunge, Astrag. **1,** 5 (1868); **2,** 3 (1869).

A. camporum Benth. ex Boissier, Fl. Or. **2,** 231 (1872).

Afghanistan: *Griffith* 1086, syntype, *A. camporum* (G; K); Baluchistan: Nichara, *Stocks* 883, syntype, *A. camporum* (G; K); Ziarat, 8500 ft., *Lace* 4035 (E); Ziarat, 8000 ft., *Crookshank* 222 (K); 195 (K); N.W.F. Province: Seven miles from Peshawar, towards Khyber Pass, 20.3.1952, *R. J. Rodin* (K); Waziristan, *J. L. Stewart* 527/K to K (K); Punjab: Karewa, Pampur, 5200 ft., *Drummond* 15033 (K; G; E); Kohat, *Drummond* 21916 (K); Naushera, Hazara, *Duthie* 21231 (K).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province, Punjab; Afghanistan.

Flowering Period: March–May.

Astragalus (**Falcinellus**) **scorpiurus** *Bunge*. Astrag. **1,** 5 (1868); **2,** 3 (1869).

Astragalus punjabicus Sirjaev in Brittonia **7, 4,** 275 (1951).

A. humifusus Jacq. ex Baker in Hooker f., Fl. Brit. Ind. **2,** 119 (1876) pro. syn., non Willd. (1803).

Baluchistan: Khojak Pass, Anar Killa Abdulla, *Duthie* 8631 (K); N.W.F. Province: Peshawar, *J. L. Stewart* (K); Dera Ismail Khan, 700 ft., *H. A. Deane* 24 (K); Punjab: Gujrat, *Drummond* 17783 (K); Salt range, *Aitchison* 159 (K); Attock, *R. R. Stewart* 7012 (K); 23604 (K); Rawalpindi, 1700 ft., *R. R. Stewart* 15309 (K); Pahl, Dt. Shahpur, *Kabir* ex Herb. *Drummond* 14864 (K; E; G); 14865 (K; E); Jaba, Dt. Shahpur, *Kabir* ex Herb. Drummond 14867 (K; E); 14866 (K; E; G); Kashmir: *Jacquemont* 14, lectotype (P); *Jacquemont* 110, syntype (P); Type numbers (K).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province, Punjab; Afghanistan.

Flowering Period: March–April.

Subgenus Astragalus

Astragalus (**Oxyglottis**) **filicaulis** *Fischer et Meyer* ex Karelin & Kirilow in Bull. Soc. Nat. Moscou **15,** 336 (1842); Fischer & Meyer ex Karelin in Bull. Soc. Nat. Moscou **12,** 152 (1838) nomen nud.; Ledebour, Fl. Ross. **1,** 637 (1843).

Astragalus leptodermus Bunge, Astrag. Turk. 208 (1880).

A. agrestis Freyn in Bull. Herb. Boissier, Ser. 2, **4,** 446 (1904).

The synonyms have been listed following Lipsky (1910), Popov (1928) and Gontscharov & Popov (1946).

The original place of publication of the species is generally given as Ledebour, Fl. Ross. 1, 637 (1842), but according to Stearn (1941) it would seem that pp. 481–790 of this work actually appeared in 1843 (probably March). The paper of Karelin & Kirilow which appeared in 1842 seems to have been generally overlooked. In view of the changed citation of the second author the matter of the typification requires careful consideration. Karelin & Kirilow cited the following two specimens: 'North Turcomania, Karelin; Mt. Arganaty, Songaria, June, 1841, Karelin & Kirilow 262. Both of these specimens are presumably at Leningrad. One of them should be chosen as lectotype.

Baluchistan: Killa Abdulla, 5200 ft., *Lace* 3547 (E); Peshin, 1.4.89, *Lace* (E); N.W.F. Province: Landi Kotal, 3500 ft., *D. Lowndes* L717 (E).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; Persia; Afghanistan; Russia, Aralo-Caspia, Balkash, Syr Darya foothills, Tien Shan, Pamir Alai, Mountain Turkemania, Kyzil Kum (Gontscharov & Popov, 1946).

Flowering Period: March–April.

This is the first record of this species from W. Pakistan.

Astragalus (**Oxyglottis**) **ammophilus** *Karelin et Kirilow* in Bull. Soc. Nat. Moscou **15,** 335 (1842).

(a) var. **ammophilus**

Russia: [Songoria, Sassyk-pastau and Arganaty, Alatau, 1841, *Karelin & Kirilow* 261, holotype (LE—not seen)]; *Karelin & Kirilow* 1386 (G; K); Azerbaijan, Nakhichevanskaya ASSR Norashenskii raion, Kadak-yal, Arpa-chai, 2952 ft., 8.5.1947, *A. A. Grossheim, I. A. Ilinskaya & M. I. Kirpichinkov* (BM); Persia: Ruinis templi urbis Persipolis in Persia australis, *Kotschy* 226; 837 (G); Afghanistan: Harirud valley, *Aitchison* 322; 407 ex parte (BM).

Distribution: Russia, Persia; Afghanistan.

Flowering Period: April.

(b) var. **persipolitanus** (*Boissier*) *Ali*, stat. nov.

Astragalus persipolitanus Boissier, Diagn. Pl. Or. Nov. Ser. 1, **9,** 60 (1849).

Baluchistan: *Stocks* 1085 (G); 1085B (K); Killa Abdulla, 5100 ft., *Lace* 3322 (E; K); Killa Abdulla, *Duthie* 863 (BM). Afghanistan: *Aitchison* 407 (K); Harirud Valley, *Aitchison* 322; 407 ex parte (BM). Persia: Ruinis templi urbis Persipolis in Persia australi, *Kotschy* 226, Herb. Boissier, holotype (G); Pr. Sser-tschah, March, 1859, Ex Herb. *Bunge* (G; K); Near Shiraz, 5000 ft., *A. C. Prott* 947 (K); Prov. Kerman, 6560 ft., *Bornmuller* 3755 (K); Persian Auf den Hügel Musella bei Hamadan, *Pichler* 209 (G).

Distribution: W. Pakistan, Baluchistan; Afghanistan; Persia; Russia (Grossheim, 1946).

Flowering Period: March–April.

A. persipolitanus Boissier was based on 'Kotschy 226. sub *A. tribuloidi*' from 'ruinis templi urbis Persipolis in Persia australi'. In the Boissier Herbarium, Geneva, *Kotschy* 226 consists of three plants. Two of these plants have glabrous pods and are the same as *A. ammophilus* Kar. & Kir.; while the third plant has pilose pods. In the original description of the species Boissier describes the pods as '. . . . . adpresse et parce hirtulis'. Therefore *A.*

persipolitanus Bossier is to be typified by this third specimen with pilose fruits. On the same sheet Kotschy 837 is also mounted; it is, however, *A. tribuloides* Delile. In the Delessert Herbarium, Geneva, there are two more sheets from the type-locality, bearing the printed labels 'Kotschy 226; 837'. Both these sheets are *A. ammophilus* Kar. & Kir. *A. persipolitanus* Boiss. has been treated as a synonym of *A. ammophilus* Kar. & Kir. (Bunge, 1869; Boissier, 1872; Grossheim, 1946). The difference between the pilose fruits of *A. persipolitanus* Boiss. and the glabrous fruits of *A. ammophilus* Kar. & Kir. is quite clear and I have not seen any intermediates between the two, therefore it seems best to give *A. persipolitanus* Boiss. varietal rank under *A. ammophilus* Kar. & Kir.

Astragalus (**Sewerzowia**) **compositus** N. Pavlov in Bull. Soc. Nat. Moscou **44,** 33 (1935).

Russia: [Montes Karakau in decliviis argillo rubro constructis ad faucem angustis Kzyl-ata prope pag. Atabajevo, 15.5.1930, fl. et fr., *S. Lipschitz* 204 (MW—not seen)]; N.W.F. Province: Swat, April, 1949, Lahore students with Prof. *Mohd. Salim* 86 (RAW); Mingora, 11.4.54, Collector unknown (LAH).

Distribution: W. Pakistan, N.W.F. Province; Russia, Tien Shan (Gontscharov & Popov, 1946).

Flowering Period: April.

This is the first record of this species from W. Pakistan.

I have not seen any specimen from Central Asia. My conclusions are based on the description of this species as given by Pavlov (l.c.) and Gontscharov & Popov (1946).

Astragalus (**Ophiocarpus**) **glaberrimus** *Sirjaev et Rechinger f.* in Anz. Osterr. Akad. Wiss. Math.-nat. **40,** 180, 1953.

Persia: Persian Baluchistan, Iramshahr, Bazman, 7.3.49, *Scharif* 718E, holotype (W); Iraq: Jebel harmin on Baqubah-Khanaqin Road, 314 ft., gypsaceous sandy hills, edge of sub-desert and steppe, 11.4.1947, *Gillett & Rawi* 7349 (K).

Distribution: Persia; Iraq.

Flowering Period: March–April.

This is the first record of the species from Iraq.

Astragalus (**Astragalus**) **tephrosoides** var. **lacei** *Ali*, var. nov. a var. *tephrosoidi* folioliis obovatis minus quam duplo (1·3–1·9) longiora quam lata (in var. *tephrosoidi* oblonga vel ovati-oblonga, plus quam duplo (2·2–2·8 plo) longiora quam lata sunt).

Baluchistan: Ziarat, 8000 ft., 1.6.1888, *Lace* 3863, holotype (E); Zarghones (Urak), 9000 ft., 29.6.52, *H. Crookshank* 396 (K).

Flowering Period: May–June.

Astragalus (**Chlorostachys**) **bakeri** *Ali*, nom. nov.

Astragalus longicaulis Baker in Hook. f. Fl. Brit. Ind. **2,** 129 (1876), non Pomel (1874).

Kashmir: July, 1838, *Falconer*, holotype (K); Kunslwan, 7750 ft., *Clarke* 29428A (K); 29428 (BM); Sind Valley to Sonamarg, 8000 ft., *R. R. Stewart* 3430 (K).

Distribution: Kashmir.

Flowering Period: May–August.

Astragalus (**Heterozyx**) **barbicalyx** *Ali*, nom. nov.

Astragalus verticillaris Bunge, Astrag. **1,** 53 (1868); **2,** 88 (1869) non Linn. (1771).

A. kurrumensis Bunge in Acta Horti Petropol. **7,** 370 (1880) non Baker (1880).

Baluchistan: Koshak Pass, *Griffith* 1588, holotype (K); Khojak Pass, *Duthie* 8636 (K); Shelabagh, 11.4.88, *Duthie* 8636 (G); Shelabagh, 6000 ft., 11.4.88, *Lace* 3527 (E); N.W.F. Province: Kurram valley, profuse in pine forests on Pewarkotal, 6–8000 ft., *Aitchison* 421 (K).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; Afghanistan.

Flowering Period: April–May.

As indicated above *A. verticillaris* Bunge is a later homonym of *A. verticillaris* Linn. (1771). The next specific epithet in chronological order is *A. kurrumensis* Bunge (1880). This is based on Aitchison's material from Kurram. It is not however the same as *A. kuramensis* Baker based on another collecting from Kurram Valley, and the two names are to be regarded as orthographic variants and hence homonyms. It is known that *A. kuramensis* Baker was published on August 3, 1880, but the correct date of publication of *A. kurrumensis* Bunge is not known. Under these circumstances, presuming them to have been published simultaneously, I have maintained the name *I. kuramensis* Baker, and there being no valid name for the present taxon, I have renamed it as *A. barbicalyx* Ali.

Astragalus (*Chlorostachys*) *maxwellii* Royle ex Bentham in Royle, Illustr. Bot. Himal. Mount. 198 (1835).

Astragalus ciliolatus Benth. ex Bunge, Astrag. **1,** 27 (1868); **2,** 33 (1869).

Kashmir: Chandow Pass, *Maxwell*, holotype (LIV); Baltal, 9000 ft., 28.9.1848, *Thomson* (K); Kashmir, *Falconer* (K); Kishtawar, 8000 ft., 14.6.1848, *Thomson* (K); Tilail, 13000 ft., *Clarke* 30669 (K); Liddar, 10000 ft., *Coventry* 576 (K); Sonamarg, 10000 ft., 5.8.1921, *R. R. Stewart* (K); Kashmir, *A. P. Young* (BM); Minimarg, 9–10000 ft., *R. R. & I. D. Stewart* 19156 (RAW).

Distribution: Kashmir, 6–13000 ft.

Flowering Period: June–July.

Bunge (1869) treated *A. maxwellii* as a doubtful species, not having seen any specimen belonging to it, while Baker (1876), who also had not seen the material, regarded it as a doubtful synonym of *A. tibetanus* Benth. ex Bunge. By the courtesy of the authorities of City Museum, Liverpool, it was possible to borrow the holotype of *A. maxwellii* Royle ex Benth. from Royle's own herbarium. A critical study of this specimen at Kew Herbarium revealed that it is actually the same as *A. ciliolatus* Benth. ex Bunge.

Subgenus Caprinus

Astragalus (**Erionotus**) **chitralensis** *Ali*, sp. nov.

Herba perennis, radice ignota, caulibus supra terram valde reductis vel fere deficientibus. *Folia* imparipinnata; stipulae 0·7–1·3 cm. longae rhachide adnatae apice liberae (3–6 mm.), integrae, acutae, pilis patentibus flavidis vestitae; foliolae 25–49, petiolulo < 1 mm. longo, lamina 4–7 mm. longa, 2–5 mm. lata, elliptica, obtusa, subtus sparse pilosa, supra copiosissime pilosa, pro parte conduplicata. *Inflorescentia* racemosa, 5-flora; pedunculus 3–5 mm. longus; bracteae 5–6 mm. longae, c. 1 mm. latae, acuminatae; pedicelli

1–3 mm. longi, pilosi. *Calyx* 1·2–1·6 cm. longus, albi-pilosus, dentibus 7–10 mm. longis. *Corolla* (in sicco) pallide lutea; vexillum 1·4–1·9 cm. longum, 4–5 mm. latum oblongi-rhomboideum, apice retusum; alae 1·4–1·6 cm. longae, ungui 6–7 mm. longo, auriculis 1–2 mm. longis; carina 1–1·1 cm. longa, ungui 6–7 mm. longo. *Stamina* diadelphia, 9 + 1, filamentis 1–1·2 cm. longis. *Ovarium* 4–5 mm. longum, stipite c. 1–2 mm. longo, dense hirsutum; stylus glaber 4–5 mm. longus, apice per 2–3 mm. curvatus; stigma capitatum. *Legumen* stipite circiter 1 mm. longo, 1 cm. longum, 4–5 mm. latum, obovatum, uniloculare, secus utrinque suturas dehiscens, pilis albis patentibus copiose hirsutum, apice acutum, curvatum. Semina reniformia, glabra, colore castanea; matura non visa.

N.W.F. Province: Chitral, Birmoghlasht, 7–8000 ft., 2.8.1954, *M. A. Siddiqui & A. Rahman* 26881, holotype (K; RAW); Chitral, *Toppin* 269 (K).

Flowering Period: May–June.

This species is closely related to *A. erionotus* Benth. ex Bunge but differs by the calyx teeth being longer than the tube (equal to or shorter in *A. erionotus*), by the vexillum being oblong-rhomboidal (instead of ovate-oblong) and by the claw of the wing being shorter (6–7 mm.) than the lamina (8–9 mm.) (longer in *A. erionotus*; c. 7–9 mm. against 6 mm.). (Fig. 1).

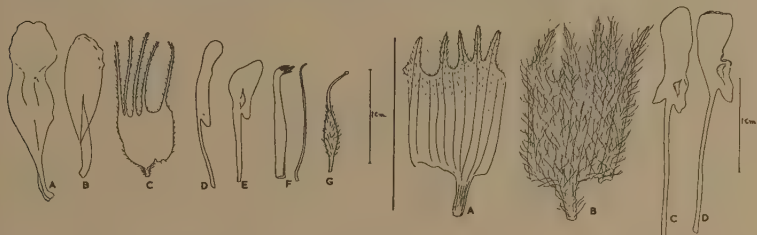

Fig. 1 Left. *A. toppinianum* [(Toppin 341 (K)]. A. Vexillum; B. Keel; C. Stamens; D. Ovary. Right. A. Vexillum of *A. bakuensis* [Bruhns 201 (G)]. B. Vexillum of *A. flemingii* [Punjab. J. L. Stewart 190 S.R. (K)].

Astragalus (**Erionotus**) **orbiculatus** *Ledebour*, Fl. Alt. **3,** 311 (1831); Ic. Pl. Fl. Ross. **3,** 26, t. 290 (1831).

[Russia: In desert of Soongoro-Kirghis, *Ledebour* (LE—not seen)]; N.W.F. Province: Chanadda, near Kabul river, 1000 ft., *H. A. Deane* 58 (K); Kashmir: Gilgit Exped., Urgan Wakhan, *Giles* 136 (K); N. of Hindukush, *Giles* (E).

Distribution: W. Pakistan, N.W.F. Province; Kashmir; Russia, Irtysh, Aralo-Caspia, Balkash, Amu Darya foothills, Syr Darya foothills; Afghanistan.

Flowering Period: April–May.

This is the first record of this species from the area under consideration.

Astragalus (**Myobroma**) **toppinianus** *Ali*, sp. nov.

Radix lignosa. *Caulis* reductus, internodiis stipulis persistentibus et foliorum basibus obtectis. *Folia* imparipinnata; stipulae laterales, basi rhachidis adnatae, 6–10 mm. longae, 3–4 mm. latae, membranaceae, pilosae, margine integrae, apice obtusae vel acutae; rhachis 5–13 cm. longa, aequaliter pilosa; petiolus 2·3–10 cm. longus; foliola in verticillis 4–12 secus rhachidem disposita, foliolis 3–6 unum quidque verticillum formantibus; petiolulo

< 1 mm. longo, lamina 5–12 mm. longa, 1–2 mm. lata, semper conduplicata, linearia vel lineari-obovata, margine integra, apice acuta, utrinque aequaliter albi-pilosa. *Inflorescentia* cymosa scorpioidis; pedunculus 0·3–2 cm. longus, pilosus; bracteae 5–7 mm. longae, c. 1 mm. latae, lanceolatae, margine integres, apice acutae, patente albi-pilosae; pedicelli 3–6 mm. longi, glabri vel parce pilosi. *Calyx* 1·5 cm. longus, dentibus 3–4 mm. longis, minute pilosulis; tubus obliquus, supra c. 1 cm. longus, subtus 1·1–1·2 cm. longus, dentes versus minute puberulus, basin versus glaber. *Corolla* (in sicco) flava vel flavi-aurantiaca; vexillum c. 2·8 cm. longum, c. 9 mm. latum, panduriforme, apice emarginatum; alae 2·5–2·6 cm. longae, 2–3 mm. latae, ungui 1·6 cm. longo, in utroque unguis latere auricula c. 1 mm. longa provisae; carina 2·1–2·2 cm. longa, 3–4 mm. lata, ungui c. 1·5–1·6 cm. longo. *Stamina* diadelphia, 9 + 1, filamentis 2·1–2·2 cm. longis. *Ovarium* 6–7 mm. longum, 1 mm. latum, stipite c. 2 mm. longo; stylus 1·3–1·4 cm. longus, basin versus pilosus, supra glaber, c. 2 mm. a stigmate angulo recto superne curvatus. Stigma globosum. *Fructus* non vidi.

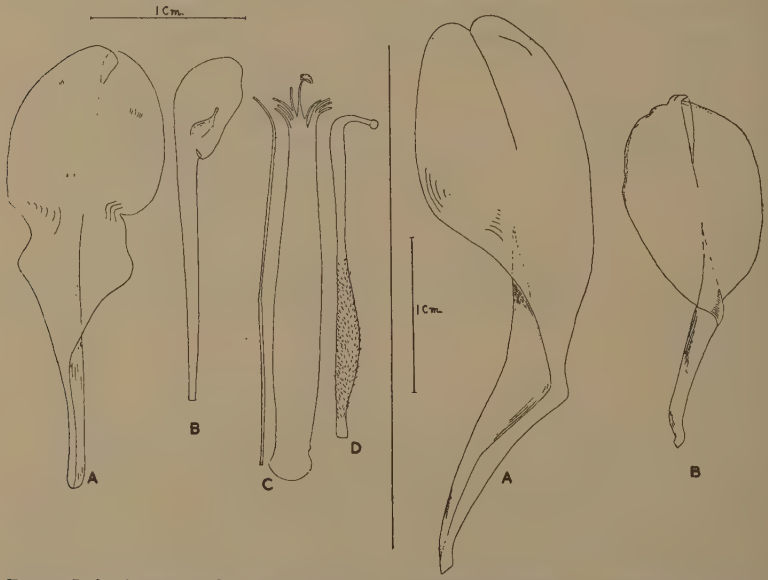

Fig. 2. Left. *A. toppianus* [Toppin 341 (K)]. A. Vexillum; B. Keel; C. Stamens; D. Ovary. Right. A. Vexillum *A. bakuensis* [Bruhns 201 (G)]; B. *A. flemingii* [Punjab. J. L. Stewart 190 S.R. (K)].

N.W.F. Province: Chitral, Shajanali, 11000 ft., May, 1908, *Toppin* 341, holotype (K); Chitral, 4000 ft., 3.6.95, *S. A. Harriss* 16034 (K).

Flowering Period: May–June.

This species is related to *A. barbicalyx* Ali, from which it is easily distinguished by the calyx being glabrous near the base and only minutely hairy in the upper portion (stiff spreading hairs on the calyx in *A. barbicalyx*) and by each wing having two auricles (only one auricle per wing in *A. barbicalyx* (See Fig. 2).

Astragalus (**Cartillagenalla**) **retamocarpus** *Boissier & Hohen.* in Boissier, Diagn. Pl. Or. Nov. Ser. 1, **9,** 68 (1849); Komarov et al. Fl. U.R.S.S. 12, t. 2 (1946).

Astragalus askabadensis O. Kuntze in Acta Horti Petropol. **10,** 182 (1887).

It has not been possible to verify the synonym. I have listed it following Gontscharov & Borissova (1946).

Persia: At the foot of the mountain Demawend above Ask, Kotschy 379, holotype (G; K). N.W.F. Province : Swat, April 1949, *Lahore Students* 101 (RAW).

Distribution: W. Pakistan, Swat; Russia, Mountain Turkmenia, Pamir Alai; Persia (Parsa, 1948).

Flowering Period: February–March.

This is the first record of this species from W. Pakistan.

Astragalus (**Myobroma**) **flemingii** *Ali*, sp. nov.

Baker (1876) reported *A. bakuensis* Bunge from Punjab. Earlier, Bunge (1869) had cited for this species 'Sabba, near petroleum springs, 4 Mart. 1841, S.R.', which he had observed in Kew Herbarium. [1841 is obviously a mistake, for the specimen in Kew Herbarium referred to by Bunge, was collected on 4.3.1851]. Boissier (1872) and Gontscharov & Borissova (1946), however do not recognise the existence of this species in Punjab, and it was therefore necessary to investigate the matter.

The type of *A. bakuensis* Bunge [Baku, *C. A. Meyer* 1270] was borrowed from Leningrad through the authorities of the Royal Botanic Gardens, Kew, and comparison showed that the specimens from Punjab are not conspecific with it. The differences between the two taxa are tabulated in Table 1.

Table 1

A. bakensis Bunge.	Punjab plants.
Leaflets ovate-orbicular, 3–9 mm. long, c. 1–5 mm. broad.	Leaflets linear, 9–27 mm. long, 2–6 mm. broad.
Rhachis 10–18·7 cm. long.	Rhachis 11–42 cm. long.
Peduncle 3–7 cm. long.	Peduncle c. 6–31·5 cm. long.
Vexillum c. 3·5 cm. long, panduriform (Fig. 4).	Vexillum 2·3–2·5 cm. long, not panduriform (Fig. 4).
Ovary stipitate, stipe c. 8 mm. long.	Ovary stipitate, stipe c. 1 mm. long.
Stipe of the fruit 7–11 mm. long.	Stipe of the fruit c. 1 mm. long.

In view of the differences it is quite clear that the Punjabi specimens belong to a different species for which the name *A. flemingii* Ali is proposed.

Astragalus (**Myobroma**) **flemingii** *Ali*, sp. nov.

Radix haud visa. *Caulis* abbreviatus, rhachidibus obtectus. *Folia* imparipinnata; stipulae 0·5–2 cm. longae, 2–6 mm. latae, pilosae, margine integres apice obtusae; rhachis 11–42 cm. longa, petiolus 4·5–21 cm. longus, aequaliter pilosus; foliola 21–41, petiolulo c. 1 mm. longo, lamina 0·9–2·7 cm. longa, 2–6 mm. lata, linearia, supra glabra, subtus aequaliter pilosa, margine integra, apice acuta. *Inflorescentia* racemosa 7–9-flora, cum pedunculo

6–31·5 cm. longa, pilosa, bracteae 0·8–1·3 cm. longae, 2–3 mm. latae, pilosae, acuminatae; pedicelli 3–5 mm. longi, albipilosi. *Calyx* aequaliter pilosus, dentibus c. 5 mm. longus; tubus supra 9–10 mm. longus, infra 10–11 mm. longus. *Corolla* (in sicco) flavi-aurantiaca; vexillum 2·3–2·5 cm. longum, 7–8 mm. latum; alae c. 2·2–2·4 cm. longae, 4 mm. latae, auricula 2–3 mm. longa, ungui 1·3–1·4 cm. longo; carina 2·1–2·4 cm. longa, c. 4 mm. lata, ungui 1·3–1·4 cm. longo. *Stamina* diadelphia, 9 + 1, filamentis c. 2·1–2·2 cm. longis. *Ovarium* stipitatum, c. 8 mm. longum, c. 2 mm. latum, dense pilosum, stipite c. 1 mm. longo; stylus 1·5–1·8 cm. longus, glabrus; stigmate capitatum. *Fructus* maturus ignotus.

Punjab: Salt Range, *J. L. Stewart* 190, holotype (K); above Sabba, Petroleum spring, lime-stone hill, 4.3.51, *Fleming* 39 (E; K); N.W. India, 1871, *J. L. Stewart* 801 (E).

Distribution: Endemic to Punjab.

Flowering Period: March.

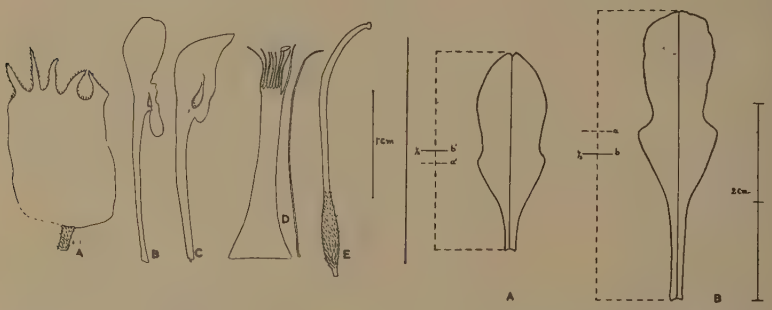

Fig. 3. Left. *A. flemingii* [Punjab. G. L. Stewart 190 S.R. (K)]. A. Calyx; B. Wing; C. Keel; D. Stamens; E. Ovary. Right. A. Vexillum of *A. pseudo-psilacanthus* [Aitchison 451, 485 ex parte (K)]. B. Vexillum of *A. psilacanthus* [Aitchison 76; 174 (K)].

Astragalus (**Myobroma**) **pindreensis** (*Benth. ex Baker*) *Ali*, stat. nov.

Astragalus candolleanus Royle ex Benth. var. *pindreensis* Benth. ex Baker in Hook. f. Fl. Brit. Ind. **2**; 133 (1876).

Kumaun & Garhwal: Garhwal, *Falconer*, lectotype (K); Pindree, 12000 ft., 1852, *Madden* (K); *Madden* 152 (E); Almora Dt., Tuktung, Dhauli Valley, 10463 ft., *Parker* 2104 (K; BM); Punjab: Chamba State, above Badrinath, 10-11000 ft., *Lace* 1464 (E); Kashmir: Fras Nag, Pir Panjal, 9000 ft., *R. R. Stewart* 23140 (K); N.W. India, *J. L. Stewart* (E).

Distribution: Kashmir; India, Kumaun, Garhwal, E. Punjab.

Flowering Period: June–July.

This species closely resembles *A. malacophyllus* Benth. ex Bunge in pods and *A. candolleanus* Royle ex Benth. in the structure of the leaves.

Astragalus (**Aegacantha**) **genistoides** *Boissier*, Diagn. Pl. Or. Nov. Ser. 1, **9,** 94 (1849); Rechinger f. in Biol. Skr. 9, **3,** t. 99, 100 (1957).

Astragalus psilopterus Bunge, Astrag. **1,** 45 (1868); **2,** 71 (1869).

Afghanistan: *Griffith* 1054, Ex Herb. Hooker, lectotype (K); *Griffith* 1055, syntype (G; K); N.W.F. Province: Chitral, Barum Gol, Shokor Shal, 11480 ft., 22.6.1950, *Wendelbo* (K).

Distribution: Pakistan, Chitral; Afghanistan.

Flowering Period: April–June.

In the original description Boissier described the wing and the keel as 'glabrous', but a study of the type-specimen in Kew Herbarium shows that the wing and the keel are, in fact, minutely pilose.

This is the first record of this species from W. Pakistan.

Astragalus psilacanthus Boissier and *A. decemjugus* Bunge.

Boissier (1849) described *A. psilacanthus* with leaves having 7–8 leaflets and small peduncles and based it on 'Griffiths 1050 and 1051 in Herb. Hooker'. Bunge (1868, 1869) pointed out that No. 1050 is different from No. 1051. He retained *A. psilacanthus* Boiss. for No. 1051, which he characterised *inter alia* by its leaves having c. 6 pairs of ovate very acute leaflets. He included Griffith 1050 in a new species *A. decemjugus* Bunge, distinguished from *A. psilacanthus* by its leaves having 10–13 pairs of leaflets which are oblong obtuse and by its elongated peduncle much longer than the flower ('pedunculis elongatis flore multo longioribus'). In the Kew Herbarium there is a Griffith specimen numbered 1051 from Hooker's Herbarium, cut from a sheet, the rest of which is missing. This plant has 5–9 pairs of leaflets and peduncles shorter than the flower. It therefore *can* be accepted as *A. psilacanthus*.

The specimen of Griffith 1050 from Hooker's Herbarium is missing. As indicated above it was included by Bunge in his *A. decemjugus*, under which he cited also Griffith 'distrib. 1538 ex p.!', another collecting not found in Kew Herbarium. As mentioned above *A. decemjugus* has leaves with 10–13 pairs of leaflets and peduncles which are much longer than the flowers, no specimen with this combination of characters has been seen.

The name *A. decemjugus* has been applied to Griffith's number 1050 from Bentham's Herbarium and to Aitchison's 76 and 174 and Harsukh's 14753, all from Kurram Valley. With them agrees one of the specimens included under Aitchison 451 and also W. R. Hay's no. 32 from Kabul. Aitchison's 76 and 174 have 12 pairs of leaflets per leaf; all the rest have up to 9 pairs of leaflets and not 10–13 pairs as described by Bunge. Further these specimens differ strikingly in the peduncle not exceeding 5 mm. in length—which is quite at variance with the description given for *A. decemjugus*. For the present these specimens have been accommodated under *A. psilacanthus*, from which they differ in the very short peduncle (5 mm. or less).

Astragalus (**Aegacantha**) **psilacanthus** *Boissier*, Dign. Pl. Or. Nov. Ser. 1, **9**, 97 (1849).

AFGHANISTAN: *Griffith* 1051, ex Herb. Hooker, holotype (K); *Griffith* 1050, Ex Herb. Benth. (K); *Griffith* 1052 in part (K); BALUCHISTAN: Khojak Pass, *Duthie* 8638 (K); Shelabagh, *Duthie* 8638 (BM; G); Shelabagh, 6000 ft., *Lace* 3529 (E; K); Pil Hill, May, 1888, *Lace* (E); N.W.F. PROVINCE: Kurram Valley, Parachanar, *Harsukh* 14753 (K); Near Kurram, HabibKalla, *Aitchison* 76 (K); 174 (K).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; Afghanistan.

Flowering Period: April–May.

Astragalus (**Aegacantha**) **pseudo-psilacanthus** *Ali*, sp. nov.

Astragalus hemsleyi sensu Boissier, Fl. Or. Suppl. 182 (1888), non Aitchison & Baker.

Herba perennis, circiter 10 cm. alta, radice lignosa elongata. *Folia* paripinnata, stipulae laterales 3–6 mm. longae, membranaceae, acutae, minute pilosae vel glabrae; rhachis 2–3·5 cm. longa, pilis patentibus pallide luteis parce pilosa; petiolum 0·7–1·5 cm. longum, foliola 12–18, petiolulo < 1 mm. longo, lamina 2–6 mm. longa, c. 1–2 mm. lata, obovata vel oblongi-obovata, pilis patentibus pallide luteis utrinque parce pilosa, margine integra, apice obtusa mucronata. *Inflorescentia* in foliorum axillis, 2–4-flora; bracteae c. 4 mm. longae, pilosae, acutae; pedicelli c. 3 mm. longi, pilosi. *Calyx* extus sparse pilosus, tubus 8–9 mm. longus, dentes duo superiores 3 mm. longi, 3 inferiores 3–4 mm. longi, acuti. *Corolla* (in sicco) flavi-aurantiaca; vexillum c. 2·1 cm. longum, c. 7 mm. latum, panduriforme; alae c. 1·9 cm. longae, c. 3 mm. latae, ungui c. 1·1–1·2 cm. longo; carina c. 1·6 cm. longa, c. 3 mm. lata, ungui c. 1·1 cm. longo. *Stamina* diadelphia, 9 + 1, filamentis 1·6 cm. longis. *Ovarium* stipitatum, c. 5 mm. longum. c. 1 mm. latum, dense pilosum, stipite c. 2 mm. longo glabro. Stylus c. 1 cm. longus, glaber, circiter 2 mm. ab apice in angulo recto superne curvatus; stigmate capitatum. *Legumen* stipite c. 1 mm. longo, 1 cm. longum, c. 5 mm. latum, pilis pallide luteis aequaliter pilosum, partim biloculari, secus suturam auperiorem dehiscens. *Semina* numerosa, c. 3 mm. longa, c. 2 mm. lata, reniforma, glabra, colore squalide rufi-brunnea.

N.W.F. Province: Kurram Valley, June 25, 1880, *Aitchison* 47; 241, holotype (K); From Kurram to Zabardast Kalla and Sikaram, *Aitchison* 451; 485 ex parte (K).

Fig. 4. *A. pseudo-psilacanthus* [Aitchison 451, 485 ex parte (K)]. A. Calyx; B. Ovary; C. Stamens; D. Keel; E. Wing.

A. canispinus Boiss. is synonymous with *A. hemsleyi* Aitchison & Baker, whereas the plant which Boissier described as *A. hemsleyi* is the present species. Boissier based his description of *A. hemsleyi* on Aitchison 451 & 485, but these specimens could not be found in the Boissier Herbarium at Geneva. The sheet bearing these collection numbers at Kew represents a mixture of three different taxa, namely *A. psilacanthus* Boiss., *A. genistoides* Boiss., and *A. pseudo-psilacanthus* Ali.

The differences between the present species and *A. psilacanthus* Boiss., its nearest ally, are summarized below:

A. psilacanthus Boiss.	*A. pseudo-psilacanthus* Ali
Leaflets 18–24.	Leaflets 12–18.
Vexillum 2·7–3 cm. long; the broadest portion lies in the upper half (Fig. 3).	Vexillum 2·1 cm. long; the broadest portion lies in the lower half (Fig. 3).
Fruiting calyx remains villous, and does not become striated.	Fruiting calyx becomes sub glabrous and longitudinally striated (Fig. 4).

Astragalus (**Aegacantha**) **hemsleyi** *Aitchison et Baker* in J. Linn. Soc. (Bot.) **19,** 158 (1882); Rechinger f. in Biol. Skr. 9, **3,** t. 131, 132 (1957).

Astragalus canispinus Boissier, Fl. Or. Suppl. 181 (1888).

AFGHANISTAN: Hariab Dist., 1880, *Aitchison* 80, lectotype (K; BM); *Aitchison* 61, syn type (K); Sarghal to Biankhel, Kurram Valley, 5.6.79, *Aitchison* 1215, syntype (K); N.W.F PROVINCE: Kurram valley, 8–9000 ft., *Harsukh* 14830 (K); BALUCHISTAN: Ziarat, 7–9000 ft. *Crookshank* 242 ex parte (K); Baluchistan, 1891–1894, *C. F. Elliot* (K); Pil Hill, May, 1888 *Lace* (E); Ziarat, 8000 ft., *Lace* 3843 (E).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; Afghanistan.

Flowering Period: May–June.

Astragalus (**Myobroma**) **subconduplicatus** Ali, nom. nov.

Astragalus aitchisonii Sirjaev & Rechinger f. in Biol. Skr. 9, **3,** 67, t. 70, 71 (1957), non Baker (1876).

AFGHANISTAN: 2–25.5.1885, *Aitchison* 380 (K); 3–6.4.1885, *Aitchison* 156 (K); [Herat, 3936 ft., 31.3.1949, fl. Koie 3563 holotype (W, C—not seen)].

Distribution: Afghanistan.

Flowering Period: March–April.

Subgenus Cercidothrix

Astragalus (**Ammodendron**) **squarrosus** *Bunge*, Astrag. **1,** 129 (1868); **2,** 226 (1869).

Astragalus macrobotrys Bunge, Astrag. **1,** 129 (1868); **2,** 226 (1869).

(a) var. **squarrosus**

BALUCHISTAN: Peeshee Bhent, Gundooa Pass, *Stocks* 761, lectotype (K); Ugai, 6000 ft., *Lace* 3570 (K); Peshin, 5200 ft., 17.4.88, *Lace* 3570 (E); Kanozai Valley, *Duthie* 18830 (K); AFGHANISTAN: *Griffith* 437 (K); 494 (K); 1102 (K); 1102A (K); 1541 (K); PERSIA: Iter persicum, Chrossan, inter Schahrud et Nischapur, Jun. 1858, Ex Herb. *Bunge* (K; P); Inter Rudbar et Mendschil vallis fluvii Sefidrud, 1048 ft., *J. et A. Bornmuller* 6828 (K; P; G); Inter Jesd et Isfahan, May, 1859, Ex Herb. *Bunge* (K; P); RUSSIA: Regio transcaspica, Kisil Arwat, in collibus arenosis ad stara, Karakala, 26.5.1901, *P. Sintenis* 1822 (P; G); Planta Turcomaniae, Dominion Buchara, Farab, *D. Litwinow* 864 (G); Turkistania, Buchara, in declinibus argilloso-arenosis, pr. Farab (ad fl. Amu-Darya), *M. Kelow et N. Androssow* 1318 (G).

Distribution: W. Pakistan, Baluchistan; Afghanistan; Persia; Russia, Buchara, Transcaspian region.

Flowering Period: June.

(b) var. **sangonensis** (*Sirjaev & Rechinger f.*) *Ali*, stat. nov.

Astragalus sangonensis Sirjaev & Rechinger f. in Anz. Osterr. Akad. Wiss. Math.-nat. **91,** 164 (1954).

A. pseudosquarrosus Sirjaev & Rechinger f. in Anz. Osterr. Akad. Wiss. Math.-nat. **91,** 164 (1954).

AFGHANISTAN: Baghdis, 19.5.85, *Aitchison* 1052 (K); PERSIA: Persian Baluchistan, Mt. Taftan, Sangon, ca. 525 ft., 19.5.1948, *Rechinger f., Aellen & Esfandiari* 4075, holotype (W); Between Zahedan (Duzdab) and Khash (Vasht, Kwash), ca. 5248–4264 ft., 15.5.1948, *Rechinger f., Aellen & Esfandiari* 4280, holotype of *A. pseudosquarrosus* (W); RUSSIA: Regio transcaspica, Kisil Arwat, in collibus, 3.5.1901, *P. Sintenis* 1597 (P; G).

Distribution: Afghanistan, Baghdis; Persia; Russia, Kisil Arwat.

Flowering Period: June.

A study of the holotype of *A. sangonensis* Sirj. & Rechinger f. has revealed that it differs from *A. squarrosus* Bunge only in the presence of the black hairs on the calyx and bract; therefore it has been accorded varietal rank.

Astragalus (**Proselius**) **sykesiae** *N. D. Simpson* in Kew Bull. 1913, p. 40.

BALUCHISTAN: Narai Kotal, 9000 ft., Lace 3728 (E); Zarghun, 8000 ft., 1.5.1888, Lace (E); Pil Hill, 7000 ft., 14.5 1889, Lace 3685 (E); PERSIA: Khorasan, *Sykes* 112, Herb. Sykes, holotype (untraceable).

Distribution: Persia, Khorasan; W. Pakistan, Baluchistan.

In Kew Herbarium there is a pencil drawing of the holotype and the diagram of the floral parts with one dissected flower.

This is the first record of this species from Baluchistan. Previously it was only known from the type locality (Khorasan, Persia).

Astragalus (**Xiphidium**) **subuliformis** *DC.* Astrag. 134 (1802).

Astragalus subulatus Pallas, Astrag. 22, t. 20 (1800).

A. anfractuosus Bunge, Astrag. **1,** 125 (1868); **2,** 218 (1869).

Philammos subulatus (Pallas) Stev. in Bull. Soc. Nat. Moscou, **29,** 146 (1856).

BALUCHISTAN: Sorrange, 7000 ft., *Crookshank* 3412 (K); Naru Karez, 5000 ft., *Lace* 3706 (K; E); Quetta, *Duthie* 8634 (K); N.W.F. PROVINCE: Kurram Valley, Parachanar, *Harsukh* 14755 (K); KASHMIR: W. of Leh, 12000 ft., 1852, *Thomson* (K); Tibet Occ., 12000 ft., *Thomson* (K); Baltistan, Paskyum, 9500 ft., *Osmaston* 124 (K); Baltistan, Dras Valley, below Matiyan, 10–11000 ft., *Duthie* 11712 (BM; E); Ladakh, Kirghil, Treaty Road, *Ludlow & Sherriff* 8356 (BM).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; Kashmir; Afghanistan; Russia, Bessarabia, Middle Dnieper, Volga-Don, Lower Don, Lower Volga, Trans Volga, Crimea, Caucasia, Upper Tobol (Gontscharov & Popov, 1946).

Flowering Period: July.

The name *Astragalus subulatus* has been generally accepted as published by M. Bieberstein in his 'Flora Taurico-Caucasica, 2, 193 (1808)', and the original place of publication i.e. 'Pallas, Astrag. 22 (1800)', though cited by M. Bieberstein, has been overlooked. There exists a homonym, *Astragalus subulatus* Desfontaine, published in his 'Flora Atlantica, 2, 186', whose title page bears the date 1800, which is the same as that of Pallas' 'Species Astragalorum, where *A. subulatus* Pallas was published. However, Stearn

(1938) has shown that Desfontaines' 'Flora Atlantica, 2: 186' was published in 1799, hence *A. subulatus* Pallas is a latter homonym and must be rejected.

De Candolle (1802) realised the existence of *A. subulatus* Desf. and gave a new name, *A. subuliformis* DC. to *A. subulatus* Pallas. However, *A. subuliformis* DC. has never been adopted by any worker and even de Candolle in his latter work (1825) treated it as a synonym of *A. subulatus* Pallas. The type specimen, collected by Pallas 'in the mountaneous places around Black Sea, e.g. of Odessa and in various places in New Russia and in mountain vallies of Crimea specially at Soldajam (Sudac)', could not be traced at the British Museum (Natural History), which possesses much of Pallas's Herbarium. Thus in the present state of knowledge fig. 20 of Pallas (1800) based on Crimean material may be taken as the type till the actual specimen comes to light.

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A new species of Dianthus from Central Africa

Dianthus chimanimaniensis *Hooper* spec. nov.; ab aliis speciebus africanis foliis manifeste trinerviis et petalis profunde pinnato-fimbriatis distinguitur.

Herba erecta, glauca; surculi floriferi ad basin ramosi, ramos foliosos unifloros gerentes; folia 2·0–2·5 cm. longa, e basi usque ad apicem valde trinervia; calyx cylindricus 3·5 cm. longus; calycis lobi lanceolati, acuti, c. 0·7 cm. longi; anthophorus longus; petalorum laminae albae vel pallide roseae, obovato-ellipticae, c. 2·0 cm. longae, 1·0 cm. latae, profunde pinnato-fimbriatae; fimbriae capillaceae ad 1·2 cm. longae.

Mozambique: Prov. Manica e Sofala, Chimanimani Mtns., Musapa Gap, quartzite slopes on N. side, c. 1380 m., 20.xii.1957. *Phipps* 838 (K, holo.; SRGH iso.).

The above diagnosis is published here to validate the name which is to be included in a forthcoming part of the 'Flora Zambesiaca'. An illustration and full description of the species will appear in Hooker's Icones Plantarum ser. 5, vol. 7, pt. 1.

S. S. Hooper.

A New Species of the Genus Struthiola (Thymelaeaceae)

B. Peterson

The genus *Struthiola* is entirely restricted to the African continent. For the moment 30 species and subspecies can be distinguished within this genus. Most of these belong to the Cape proper, while a few are to be found in Natal. *S. thomsonii* Oliv. forms the northern border line of the genus in reaching Mega in southern Ethiopia (cf. Peterson, Bot. Not. 111: 420. 1958), and a second species in Tropical Africa occurs in Belgian Congo (cf. Staner, Bull. Jard. Bot. Brux. 13: 368. 1935). For some time an undescribed species of *Struthiola* has been known from the mountains in eastern S. Rhodesia. In a paper on some records of phytogeographic interest Wild in Proc. Rhod. Scient. Ass. 43: 6. 1951, mentions this species as probably new, apparently closely allied to *S. parviflora* Bartl. ex Meisn. This new species, described below, is found in S. Rhodesia in localities which are situated within the Inayangani Subcentre [cf. Weimarck, Lunds Univ. Årsskr. N.F. Avd. 2. 37 (5): 78. 1941]. These localities form in all probability remnants of an ancient bridge between the south and tropical African elements of *Struthiola*.

Struthiola rhodesiana *B. Peterson* sp. nov. *Frutex* vel suffrutex ericoideus ramosus, 1·5–6 dm. altus, saepe pluribus ramulis gracilibus e rhizomate incrassato. *Ramuli* teretes vel juniores tetragoni cicatricibus foliorum distincte prominentibus scabri, glabri vel aliquando nodis inter insertiones foliorum paululum pilosis. *Folia* sessilia, lanceolata, apice acutiuscula, opposita, imbricata, tota glabra, (3–) 5–7 (–9) mm. longa, 1–1·2 mm. lata, dorso convexa plerumque striata. *Bracteolae* 2, foliaceae, lanceolatae, carinatae, marginibus parce ciliatis plerumque fere ad medium a basi, (2–) 3–4 (–4·5) mm. longae. *Inflorescentia* axillaris. *Flores* hermaphroditi, flavi, interdum pallide viridi colore variantes (sicci saepe subfusci), sessiles, solitarii, ad basim corona setularum cincti. *Tubus* calycis gracilis, in superiore parte parum dilatatus, glaber, post deflorationem supra ovarium decidens, (6·5–) 7–8 (–9·5) mm. longus (incl. lobi), limbo 4-partito, lobis cuneatis-lanceolatis, exterioribus ± 2 mm. interioribus ± 1·5 mm. longis. *Petala* 8, carnosa, rubra, teretia, anguste oblonga, ± ½ mm. longa, in fauces tubi inserta, singula basi corona setularum albarum petalis paulo longiorum cincta. *Stamina* 4, in fauces calycis inserta, lobis alterna; antherae subsessiles, ± 1 mm. longae, introrsae, inclusae, basi affixae, rimis 2 longitudinalibus dehiscentes, apice acutae; pollen sphaeroideum polyforatum, ± 20μ in diam. *Ovarium* ovatum sessile, glabrum, uniloculare; stylo laterali, filiformi, magis minusve paene insertionem staminum attingenti; stigma clavatum papillosum. *Discus* membranaceus forma annuli parvi circa basim ovarii. *Fructus* siccus, pericarpio membranaceo, basi tubi persistenti ± inclusus. *Semen* unicum, ± 2 mm. longum, albuminosum, testa crustacea, nitide nigra. *Embryo* cotyledonibus carnosis.

Orig. coll. Southern Rhodesia, Inyanga District, Mare River, 1800 m. s.m., *Wild*, 21.10.1946, n. 1449 (K, holotype).

Distribution: Known only from the eastern mountain area in Southern Rhodesia.

The new species is very closely related to *S. parviflora* Bartl. ex Meisn. and *S. scaettae* Staner. It is distinguished from the first one by the branches which are completely glabrous, the non-ciliated leaves and the lack of tufts of hair on the outer calyx-lobes. It is separable from *S. scaettae* by the ciliated bracteoles, the shape of the lobes which are only about half of the size of those of *scaettae* and by the petals and anthers which are about twice as big. *S. parviflora* is a Cape species extending from the Swellendam District in the west to the Stutterheim District in the east. *S. scaettae* has been found only once, viz. on Mt. Muhende-Kivu in Belgian Congo.

S. rhodesiana was collected for the first time in the Inyanga Mountains in 1930 by the Swedish botanical expedition in Southern Rhodesia. Later on it was found on several localities within the same mountain range. In 1949 it was also collected in the Chimanimani Mountains, and in 1956 the author had the opportunity of seeing this species growing at the Pungwe River. There it was found on a slope facing east near the Pungwe Falls growing together with *Blechnum tabulare*, *Mohria caffrorum*, *Panicum coloratum*, *Drosera trinervia*, *Gnidia kraussiana*, and *Lobelia erinus* among others.

Specimens examined. S. Rhodesia. Inyanga District: In latere occidentali montis Inyangani, in campo fruticoso, c. 2200 m. s.m., *Fries*, *Norlindh et Weimarck*, 7.12.1930, n. 3576 (LD).—In montibus Inyanga ad villam 'Inyanga Down' in campo graminoso, c. 2000 m. s.m., *Norlindh et Weimarck*, 29.1.1931, n. 4646 (LD).—Pungwe Hills, Hopkins, 9.11.1945, s.n. (SRGH n. 13831).—Mare River, 1800 m. s.m., *Wild*, 21.10.1946, n. 1449 (K, holotype; LD, PRE, SRGH).—In open grassland, on way to Hanmers 'thro' Wyrley Birch' [Troutbeck], *Rattray*, 22.10.1946, n. 930 (NBG, SRGH).—On way to Wyrley-Birch's farm [Troutbeck], *Sturgeon*, Oct. 1946, s.n. (PRE, SRGH n. 16953).—Pungwe Falls, steep slope below Pungwe View Point, eastern aspect, c. 1500 m. s.m., *Dahlgren et Peterson*, 5.1.1957, n. 1664 (LD).—Melsetter District: Chimanimani Mountains, Bonde Valley, 1700 m. s.m., *Wild*, 5.6.1949, n. 2848 (NBG, SRGH).—Chimanimani Mountains, Mt. Peza, 1800 m. s.m., *Munch*, 15.10.1950, n. 296 (SRGH).

Critical Notes on some Australian Helotiales and Ostropales

R. W. G. Dennis

The following notes and descriptions are based in part on collections forwarded to Kew from the Herbarium of the Waite Agricultural Research Institute, Adelaide. I have added observations made on the type collections of a number of species briefly described by Berkeley, Cooke, Massee, Hennings and the late L. Rodway of Tasmania. Very few of these have previously been figured and the diagnoses usually omitted features regarded as essential for recognition of species of these fungi by modern standards. It seems likely that most of the species will prove to be widespread in south-east Australia but hitherto they have seldom been collected, or at least identified.

Rodway's type collections have most kindly been sent on loan to Kew from the herbarium of the Tasmanian Museum, Hobart, and examination of them has shown that he had only the vaguest ideas regarding the limits of fungus genera. Hence it has been necessary, not only to amplify his descriptions, but also to redispose most of his species. It must be realised, however, that though the modern concept of genera is more precise, there is still no general agreement regarding the application of the older generic names in this group of ascomycetes. Thus, the genus called *Rutstroemia* by White and the writer was termed *Phialea* by Boudier and *Calycina* by Seaver. *Phialea* as employed in this paper is, of course, a very different genus. Rodway cited no collections and designated no types in his published diagnoses but fortunately he indicated which collection was regarded as the type on his herbarium packets so that there is little risk of misinterpreting his species now that his herbarium has been re-examined.

Hyaloscyphaceae

Perrotia lutea (*Phill.*) *Dennis*, comb. nov.

Erinella lutea Phill. in Grevillea **19,** 61 (March 1891).

Erinella novae-zelandiae Massee in Journ. Bot. **34,** 147 (1896).

Apothecia gregarious, up to 3 mm. across, disc concave, light yellow, receptacle cupshaped with prominent broad margin, densely hairy, margin white, the remainder brown with yellowish hairs, seated on a short, stout, darker brown stalk. Excipulum pseudoparenchymatous, formed of isodiametric cells 6–8μ across, hairs cylindrical, obtuse, septate, their walls thin and colourless at the tip, becoming thicker and brown towards the base, covered with fine granules throughout, up to about 150 × 3–4·5μ, sap yellowish. Asci cylindric-clavate, thick-walled and obtuse, 8-spored, 210–225 × 20–22μ, apex unstained in Melzer's reagent ; ascospores fasciculate, cylindric-fusiform, somewhat more tapering in the lower half, up to 31-septate, hyaline, 90–125 × 4–5μ. Paraphyses narrowly cylindrical, obtusely rounded, septate, 2·5–3μ thick. On dead wood and bark. Fig. 1.

Victoria : *Mrs. Martin* 514, typus of *E. lutea*.

South Australia : *Craigie*, 17.6.1917, leg. *E. J. Simmens* 52, W.A.R.I. 2741.

New Zealand : Not localised, typus of *E. novae-zelandiae*.

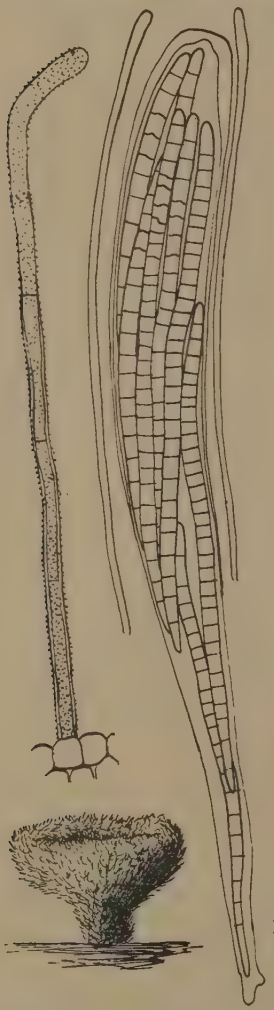

Fig. 1. *Perrotia lutea*. Apothecium × 10, ascus, paraphyses and hair × 660.

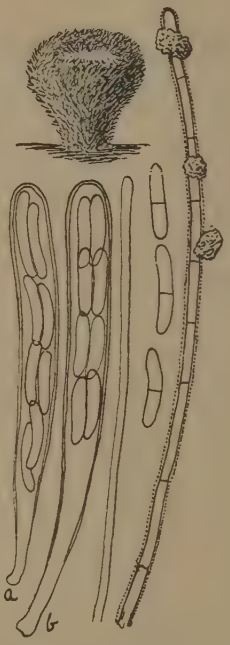

Fig. 2. *Perrotia aurea*. Apothecium × 10, details × 660. (a) ascus of P. flammea, (b) ascus, paraphysis, spores and hair of P. aurea.

Massee described the ascospores of *E. novae-zelandiae* as 85–95μ long but in the type collection I find them up to 125μ, just as in *E. lutea*.

To what genus should this curious fungus be assigned? In notes on each of the three collections cited I have commented that the asci appear bitunicate and in two of them asci were seen in which the contents, still apparently retained by a thin inner membrane, protruded through the thick outer

wall which had been ruptured by squashing the mount. Truly bitunicate asci are, however, quite unexpected in a fungus of this kind and it seems likely the unusually thick wall in *E. lutea* is due to the exceptionally large size of the asci in this species. It seems best to await observations on dehiscence of living asci before pronouncing them to be bitunicate.

Erinella Quél., to which Phillips and Massee referred their species, is regarded today as a synonym of *Dasyscyphus* S. F. Gray. The habit of the apothecia and the kind of hair are like those of a *Dasyscyphus*, even the pseudoparenchymatous excipulum can be matched in *D. cerinus*, to which indeed *E. lutea* bears considerable resemblance. The very large asci and ascospores and the cylindrical obtuse paraphyses, however, are not those of a typical *Dasyscyphus*. Even in those species described as having the paraphyses " filiform " their tips are usually pointed, not obtusely rounded, as here. *Dasyscyphella* Tranzschel was founded for *Dasyscyphus*-like fungi with acicular ascospores. Its type species has not been studied by modern methods but it was stated to have the ascus pore blued by iodine, as have the tropical species referred to *Dasyscyphella* by subsequent authors. The type species of *Lasiobelonium* Sacc. has very delicate smooth hairs and quite a different habit from *E. lutea*. I have not seen the curious genus *Arenaea* Penz. & Sacc. and it is not clear from the diagnosis and published figures whether its asci are thick-walled or not nor whether the pore is blued by iodine. Its ascospores, however, appear to be very different from those of *E. lutea*. A closer resemblance to the latter is to be found among the species of *Trichoscyphella* Nannfeldt, which show a wide range in size and shape of ascospores and have cylindrical, obtusely rounded paraphyses. All *Trichoscyphellas* have white hairs and their asci are relatively thinwalled and in these features they differ from *E. lutea*. Probably the closest resemblance to the latter is shown by the curious fungus *Peziza flammea* Alb. & Schw. ex Fr., on which Boudier based his genus *Perrotia*, distinguished by its peculiar asci which he thought to be operculate. *P. flammea* has coloured hairs very like those of *E. lutea*, though with reddish instead of yellow pigment, similarly shaped though much smaller asci, with relatively thick walls and rounded tips not blued by iodine and septate ascospores rounded at the ends. The habit, too, on bark, is like that of the Australian fungus. I propose, therefore, to revive the genus *Perrotia*, but amongst the Helotiales instead of amongst the Pezizales where Boudier placed it, and to transfer to it both *E. lutea* and the following species, *Dasyscypha aurea* Massee.

Perrotia aurea (*Massee*) *Dennis*, comb. nov.

Dasyscypha aurea Massee in Journ. Bot. **34,** 146 (1896).

Apothecia gregarious, disc yellow, concave, up to 2 mm. across, receptacle cup-shaped, with a short stout base, buff, clothed with short sulphur-yellow hairs. Hairs cylindrical, up to 200 × 3μ, multiseptate, with thin, hyaline to light yellow walls covered with fine granules and with rounded tips. Amongst the hairs and especially those towards the margin of the disc are irregular masses of a yellow granular substance, insoluble in water or KOH solution. Asci cylindric-clavate with rounded tips, not blued in Melzer's reagent, 105–110 × 10μ, 8-spored ; ascospores biseriate, cylindrical with rounded ends, straight or slightly curved, 1-septate at maturity, 14–21 × 3–4μ. Paraphyses cylindrical, 2μ wide, with rounded tips. Fig. 2.

Victoria : On bark, leg. *F. Reader* (Typus).

Tasmania : On bark of *Casuarina*, Nov. 1917, *L. Rodway*.

The resemblance to *Perrotia flammea* is here particularly striking, as is shown in Fig. 2a, b, where the asci of the two species are drawn side by side at the same magnification. In the European species, however, the granules among the hairs are reddish-purple and dissolve in ammonia or KOH solution. Massee commented on the close resemblance between *D. aurea* and *E. novae-zelandiae* but was forced to place them in different genera because he was following the artificial system popularised by Saccardo, in which the shape and septation of the ascospores is a primary generic character.

Zöllneria eucalypti (*Berk.*) *Dennis*, comb. nov.

Dasyscyphus eucalypti (Berk.) Sacc., Sylloge Fungorum **8,** 462 (1889).

Peziza eucalypti Berk. apud Hooker, Flora Tasmaniae **2,** 274 (1860).

Ciboria strigosa Rodway in Proc. Roy. Soc. Tasmania **1924,** 105 (1925).

Apothecia scattered, superficial ; disc 1 mm. or more in diameter, concave, light yellow, drying orange ; receptacle saucer-shaped, soft-fleshed, yellow to olive when fresh, drying dark reddish-brown, bearing scattered, stiff, somewhat spreading, dark red to blackish bristles. These measure up to about 350 × 11μ, with numerous septa and moderately thick, smooth, red-brown walls, tapering slightly to the thinwalled, almost hyaline, rounded tips; between them are short, nonseptate, smooth, brown hairs adpressed to the excipulum and formed by the free tips of the excipular hyphae. Stalk cylindrical, slender, often longer than the diameter of the disc, concolorous, with few hairs in the upper part or none. Asci cylindric-clavate, 95–110 × 8–9·5μ, 8-spored, the pore outlined blue in Melzer's reagent ; ascospores uniseriate, ellipsoidal or inequilateral, slightly pointed below, nonseptate, hyaline, 12–17 × 3–5μ. Paraphyses cylindrical with rounded tips, 2–2·5μ wide, with oily contents. On fallen leaves and cladodes.

Tasmania: Mt. Nelson range, on *Acacia melanoxylon*. June 1918, *L. Rodway* 832; National Park, June 1924. leg *Rodway* ; unlocalised, probably on the same substrate, leg. *W. Archer* (Typus). Fig. 3 right.

South Australia: On *Eucalyptus*, Mt. Lofty, 21.5.1954, leg. *C. G. Hansford*; On *Banksia*, Bangham, 13.6.1952, leg. *J. Warcup*.

Victoria: Macedon, on *Acacia longifolia*, leg. *F. Martin* 464.

Massee (1897) suggested *P. eucalypti* 'should be placed in the genus *Cyathicula* characterized by the spines or teeth of the margin consisting of a fascicle of hyphae' but did not make the required combination. This opinion appears to have originated in a misunderstanding of the nature of the bristles.

Zöllneria clelandii (*Hansford*) *Dennis* comb. nov.

Lachnella clelandii Hansford in Proc. Linn. Soc. New South Wales **79,** 126 (1954).

Differs from the preceding in its usually larger apothecia, dark coloured stipe bristly throughout, longer bristles and larger asci, 150–190 × 10–11μ, with slightly larger ascospores, 15–19 × 5–7μ. On fallen twigs and woody debris.

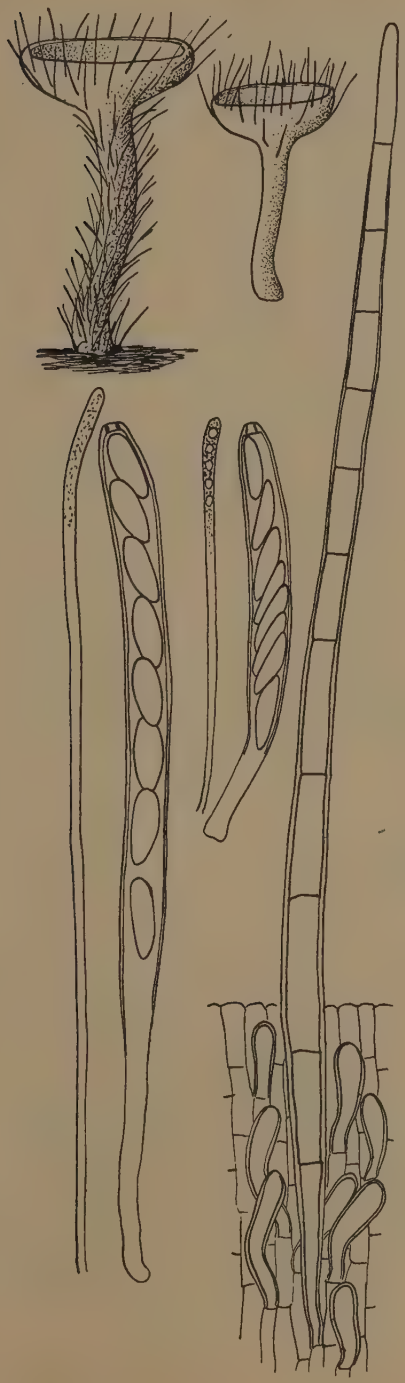

FIG. 3. *Zollneria* spp. On left apothecium, ascus and paraphysis of Z. clelandii; on right apothecium, ascus, paraphysis, hair and part of excipular surface of Z. eucalypti. Apothecia × 20, details × 660.

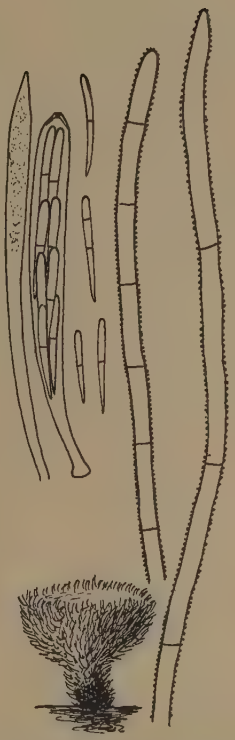

FIG. 4. *Dasyscyphus lachnodermus*. Apothecium × 10, ascus, paraphyses, spores and hairs × 660.

South Australia: National Park, on *Eucalyptus* twigs, leg. *J. B. Cleland*, 26.5.1926, W.A.R.I. 2545; Meningie, July 1957, leg. *L. D. Williams*, W.A.R.I. 8579.

Judging by Rodway's published comments it seems doubtful if *D. clelandii* will prove specifically distinct from *D. eucalypti*. In Proc. Roy. Soc. Tasmania 1919, p. 114, 1920, he noted '*Dasyschypha eucalypti* Berk. is much more variable than indicated in Cooke's Handbook. It grows on all sorts of dead twigs and leaves, sometimes attaining 4 mm. diameter, the disc is livid when fresh, deep orange when dry, spores 16–24 × 4·5–8μ.' This description seems intended to cover both species. So, probably, was his second description in the same journal for 1924, p. 105, 1925, where he transferred the species to *Ciboria* under the new name *Ciboria strigosa*, with the note, 'Disc concave to convex, fleshy yellow when fresh, dark when old and dry, 2–6 mm. diameter; externally pale livid then dark; armed externally especially on the margin with few dark stiff bristles; stem thin, long, black to very short; spores 16 × 4–5μ. When the ascophore arises in a crevice and is erumpent the stem is very long; when growing in shade on dead leaves or twigs it is medium and when on smooth bark it is almost obsolete.' Hansford made no reference to Rodway's papers when he published *L. clelandii* and it seems likely he did so in ignorance of the above suggestive field notes and clearly expressed opinion on the variability of the fungus.

These two species or varieties differ from those in *Dasyscyphus* section *Glandulosae* in having stipitate apothecia and perfectly cylindrical paraphyses with rounded tips. Section *Glandulosae* appears to be a natural group and may well prove worth generic rank though the name *Lachnella* often applied to it is inapplicable as it was based on a basidiomycete. Just this combination of rather sparse, smooth, brown, glandular hairs and cylindrical obtuse paraphyses is found in *Zöllneria rosarum*, on dead rose leaves in Europe, and I accordingly propose to transfer *D. eucalypti* and *L. clelandii* to *Zöllneria*.

Dasyscyphus lachnodermus (*Berk.*) *Rehm* in 26 Berichte Naturhist. Vereins Augsburg, 761 (1881).

Peziza lachnoderma Berk. apud Hooker, Flora Tasmaniae **2,** 274 (1860).

Lachnum lachnodermum (Berk.) Hahn & Ayers in Mycologia **26,** 174 (1934).

Apothecia gregarious, superficial; disc concave, yellow, 2–3 mm. across; receptacle shallow cup-shaped, soft, covered with short, white, somewhat spreading hairs; stalk short, stout, white and hairy above, dark brown to black at the base. Hairs cylindrical, often slightly undulating, thin-walled, hyaline, obtusely rounded or tapering slightly to a point, up to 160 × 4–5μ, sparingly septate, their walls covered with minute granules. Asci cylindrical, apex pointed, stalk short, 8-spored, pore blued by Melzer's reagent; ascospores biseriate, cylindric-clavate, pointed below, 1-septate, hyaline, 15–23 × 1·5–2μ. Paraphyses narrowly lanceolate, 3μ wide, about 10μ longer than the asci, with finely granular contents. On bark of living trees. Fig. 4.

Tasmania: unlocalised, leg. *Archer* (Typus).

Victoria: Belgrave, 27.9.1934, leg. *Willis*, W.A.R.I. 2781.

Peziza lanariceps Cooke & Phillips in Grevillea **8,** 62, 1879 may be only a stunted form of the above species for I cannot find in the scanty type collection any of the purple granules mentioned in the diagnosis.

Dasyscyphus virgineus *S. F. Gray*, Natural Arrangement of British Plants **1,** 671 (1821).

Apothecia scattered, disc up to 1·5 mm. diameter, yellowish; receptacle saucer-shaped, white, drying pale yellowish-brown, clothed with persistently white short hairs; stalk slender, cylindrical, concolorous and equally hairy. Hairs cylindrical, up to 55 × 3–4μ with tips usually slightly swollen to 4·5–6μ, usually 3-septate, wall thin, finely granular, apical cell stained deeply by cotton blue. Asci 40–44 × 4–5μ, pore blued by Melzer, ascospores fusiform, 7–9 × 1–1·5μ; paraphyses lanceolate, 3μ wide, up to 15μ longer than the asci.

New South Wales: Mosman, on slender twigs, 1944, W.A.R.I. 2744.

The above brief description drawn up from the Australian material is sufficient to show it to be specifically identical with this common European fungus.

Dasyscypha candida Rodway 1925, on bark in Tasmania, is in my opinion not specifically distinct from *D. virgineus*. The type collection, Cascades, July 1924, differs only in its rather broad ascospores, 7–8 × 2μ, and less lanceolate paraphyses 2·5–3μ wide. The fungus published by Rodway as '*Dasyscypha virginea* Fckl.' is a *Hyaloscypha*, possibly undescribed, but the material in Rodway's packet is insufficient to form the basis of a new species.

Dasyscyphus glabrescens (*Cooke & Phillips*) *Saccardo*, Sylloge Fungorum **8,** 451 (1889).

Peziza glabrescens Cooke & Phillips in Grevillea **8,** 62 (Dec. 1879).

Apothecia scattered, superficial; disc concave, up to 1 mm. diameter; receptacle cupshaped, soft, white, drying cream coloured, clothed with fine, downy, white hairs; stalk slender, cylindrical, downy, concolorous. Hairs cylindrical, often undulating, 1–2-septate, with thin, hyaline, granulate walls, up to 60 × 4μ, their tips vary from slightly enlarged to more often slightly tapering, sometimes tipped by coarser granules. Asci cylindric-clavate, about 80 × 9μ, 8-spored, pore blued by Melzer's reagent; ascospores cylindric-fusiform, nonseptate, 13–18 × 3μ. Paraphyses narrowly cylindrical, 1·5–2μ wide, with pointed tips, not longer than the asci. On bark.

Victoria : Melbourne, on ?*Rhipogonum* (Liliaceae), No. 379 (Typus). Fig. 5.

Dasyscyphus hyalopus (*Cooke & Massee*) *Dennis*, comb. nov.

Erinella hyalopoda Cooke & Massee in Grevillea **19,** 48 (Dec. 1890).

Apothecia scattered, superficial ; disc concave, about 0·5 mm. diameter; receptacle cup-shaped, soft and delicate, white, clothed with short white hairs; stipe slender, cylindrical, hairy, white or drying buff towards the base. Hairs cylindrical, 80–100 × 3–4μ, tips slightly swollen to 4–6μ and rounded, walls thin, hyaline, granulate, septa usually 3. Asci cylindric-clavate, 95–100 × 9–10μ, 8-spored, pore blued by Melzer's reagent; ascospores parallel, narrowly cylindrical, curved or undulating, ends obtuse, ultimately multiseptate, 39–46 × 2μ. Paraphyses lanceolate, 3μ wide. Fig. 6.

New Zealand: on dead *Phormium*, leg. *T. Kirk*, 340 (Typus).

This species closely resembles *D. dussii* Dennis, on twigs in Guadeloupe, but in the latter the whole fungus is light yellow and the terminal cell of each hair is filled with yellow oil. Fresh collections or good field notes on fresh apothecia are desirable for comparison with the common *D. apalus* (Berk. & Br.) Dennis which, however, typically lacks the swollen tips to the hairs and is commonly supposed to be confined to *Juncus*.

FIG. 5. *Dasyscyphus glabrescens*. Apothecium × 8, ascus, paraphysis and hair × 660.

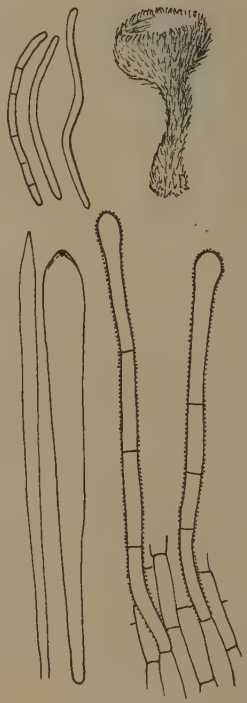

FIG. 6. *Dasyscyphus hyalopus*. Apothecium × 30, ascus, paraphysis, spores and hairs × 660.

Dasyscyphus pritzelianus (*P. Henn.*) *Dennis*, comb. nov.

Erinella pritzeliana P. Henn. in Hedwigia **42,** Beiheft (86), 1903.

Apothecia scattered, superficial, disc concave, pale yellow, scarcely 1 mm. across, receptacle shallow cup-shaped, pure white, with a well defined cylindrical white stalk shorter than the diameter of the disc, downy throughout. Hairs cylindrical, thinwalled, finely granulate, hyaline, sparingly septate, 35–50 × 3·5–4μ. Asci cylindric-clavate, short-stalked, 70 × 8μ, apex conical with minute pore blued by Melzer's reagent, 8-spored; ascospores fasciculate, usually slightly curved, cylindrical with rounded ends, hyaline, 50–55 × 1–1·5μ, nonseptate but crowded with 35–40 minute guttules. Paraphyses abundant, cylindrical, 2–3μ wide, only slightly longer than the asci. On dead 'twigs'. Fig. 7.

QUEENSLAND: Russel River, June 1902, *Pritzel* 154, portion of the type number in Herb. Sydow, Stockholm.

The hairs are considerably longer than stated by Hennings, 10–20 × 3·5μ, and are those of a typical *Dasyscyphus*. The substrate appears to be a scrambling woody Monocotyledon, probably a *Calamus*, having the axis set with groups of 5 spines at about 2·5 cm. intervals.

Dasyscyphus pteridophyllus *Rodway* in Pap. & Proc. Roy. Soc. Tasmania **1920,** 158 (1921).

Apothecia gregarious, superficial, disc concave, light yellow, up to 0·5 mm. diam. receptacle cupshaped, with a cylindrical slender stalk, lemon yellow, downy throughout. Hairs cylindrical, obtuse, up to 55 × 3μ, with thin, yellow, granulate walls, sparingly septate, liberating a little yellow sap into ammonia. Asci cylindric-clavate, 40–50 × 4–5μ, pore minute, blued by Melzer's reagent, 8-spored; ascospores irregularly biseriate, narrowly fusiform, pointed at each end, 11–17 × 1–1¼μ. Paraphyses delicate, cylindrical with pointed tips no longer than the asci, with finely granular contents. On dead stalks of *Dicksonia antarctica*.

Tasmania: National Park, Oct. 1920 (Typus); June 1924. Herb. Tasmanian Museum. Fig. 8.

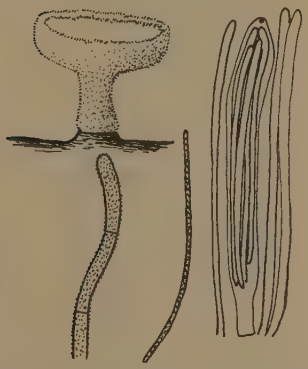

Fig. 7. *Dasyscyphus pritzelianus*. Apothecium × 20, ascus, paraphyses, spore and hair × 660.

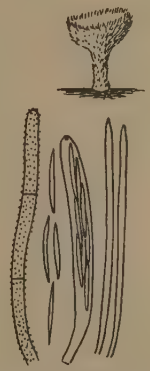

Fig. 8. *Dasyscyphus pteridophyllus*. Apothecium × 20, hair, spores, ascus and paraphyses × 660.

Dasyscyphus subciboria (*Rodway*) *Dennis*, comb. nov.

Phialea subciboria Rodway in Pap. & Proc. Roy. Soc. Tasmania **1924,** 104 (1925).

Apothecia scattered, superficial; disc flat or slightly concave, up to 2 mm. diameter, white, drying light brown to black; receptacle saucer-shaped on a short slender stalk, black throughout, minutely downy. Excipulum composed of 2–3 layers of angular almost isodiametric cells, 8–12μ across, with very dark brown thin walls, becoming more elongated and rectangular towards the margin, bearing numerous cylindrical, sparsely septate, hairs up to 100 × 2·5–3μ, with thin very dark gray-brown walls sheathed by a hyaline, brittle, incrustation about 1μ thick. Flesh thin, whitish, composed of closely woven hyphae; subhymenium thin, light brown. Asci cylindric-clavate,

60 × 5μ, 8-spored; ascospores irregularly biseriate, hyaline, nonseptate, elliptic-cylindric, 7–10 × 2–2·5μ; paraphyses slender, cylindrical, obtuse, 2μ wide. On decorticated wood. Fig. 9.

TASMANIA: Cascades, Hobart, Oct. 1919, typus Herb. Tasmanian Museum.

The closest analogy is with *D. elegantulus* (Karst.) Karst., common on herbaceous stems in Scandinavia. There seems to have been a curious confusion in Rodway's herbarium about this name. He evidently collected two fungi at the same time and the envelope of *Phialea subciboria* now contains two packets. That labelled *Phialea subciboria* in Rodway's handwriting contains another fungus, perhaps a state of that described below as *Rutstroemia lanaripes*. In spite of the label this cannot be the fungus published as *P. subciboria* which, on the contrary, is to be found in the other packet, labelled *Helotium subciborium*.

FIG. 9. *Dasyscyphus subciboria*. Apothecium × 15, hair, excipular cells, ascus and paraphysis × 660.

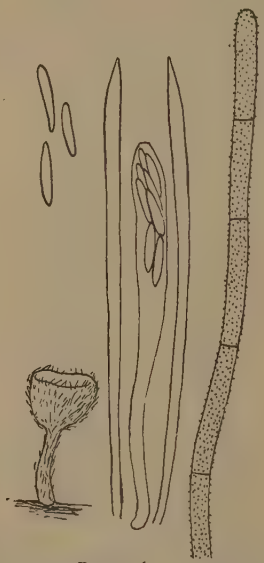

FIG. 10. *Dasyscyphus enzenspergerianus*? Apothecium × 10, ascus, paraphyses, hair and spores × 660.

?Dasyscyphus enzenspergerianus (*P. Henn.*) *Dennis*, comb. nov.

?*Lachnum enzenspergerianum* P. Henn. in Deutsche Sudpolar Exped. Bd. **8,** 1906.

Apothecia scattered, superficial; disc about 0·5 mm. diameter, concave, white; receptacle cupshaped, white, drying pinkish, hairy, with a slender cylindrical stalk up to 0·5 mm. long. Hairs cylindrical, straight or undulating, obtuse, with thin, hyaline, granulate walls, up to 125 × 4–5μ and up to 4 septate; asci cylindric-clavate, 75–85 × 5–7μ, 8-spored, pore not blued by Melzer's reagent; ascospores biseriate, elliptic-fusiform, nonseptate, 9–15 × 2–2·5μ; paraphyses lanceolate, hyaline, 3–4μ, wide, up to 20μ longer than the asci. On dead leaves of *Poa foliosa*.

Macquarie Islands: leg. *J. Blunt*, 28.12.1954. Fig. 10.

The above determination is queried because I have been unable to trace authentic material of *L. enzenspergerianum* for comparison. It was described from leaves of *Poa cookii*, on Possession Island in the Crozet group, about latitude 46° S. in the Indian Ocean, i.e. in a similar latitude and habitat to that of the fungus collected by Blunt. There are, however, minor discrepancies between the description given by Hennings and that set out above, especially in the length of the stalk, which he gives as 100 × 100μ.

Fig. 11. *Cistella carnosa*. Apothecium section × 660.

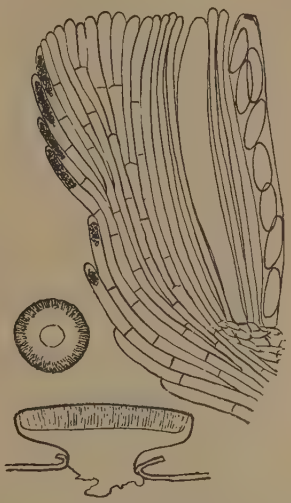

Fig. 12. *Pezizella notofagi*. Under side of apothecium × 10, diagrammatic section × 30, section of marginal tissues × 660.

Cistella carnosa (*Rodway*) *Dennis* comb. nov.

Helotium carnosum Rodway in Pap. & Proc. Roy. Soc. Tasmania **1920,** 155 (1921).

Apothecia scattered, superficial; disc flat or convex but with an involute margin, whitish, then ochraceous; receptacle saucer-shaped, sessile on a broad base, concolorous, minutely pruinose. Flesh composed throughout of short and narrow thinwalled cells, running out at the surface into 1–2-celled hairs with thin colourless walls, some cylindrical, up to 25 × 2μ, the majority more or less ovate and up to 5μ wide. Asci cylindric-clavate, 50–55 × 6–7μ, 8-spored, the minute pore blued by Melzer's reagent; ascospores usually biseriate, cylindric-fusiform, nonseptate, 6–7 × 1·5μ; paraphyses numerous, cylindrical, obtusely rounded at the tip, 1·5–2μ thick. On decorticated wood. Fig. 11.

Tasmania: Cascades, Hobart, August 1919, typus in Herb. Tasmanian Museum.

Helotiaceae

Pezizella notofagi (*Rodway*) *Dennis* comb. nov.

Mollisia notofagi Rodway in Pap. & Proc. Roy. Soc. Tasmania **1924,** 102 (1925).

Apothecia scattered, erumpent from the mesophyll; disc flat, 0·5 mm. diameter, hyaline-gray, drying light yellowish brown; receptacle saucer-shaped, with a short stem-like base, smooth, concolorous but striate with short, blackish-brown, vertical lines below the margin. Excipulum of parallel, thin-walled, hyphae 2·5–3μ wide, terminal cell often filled with dark brown matter, to form the dark striae on the upper parts of the receptacle; asci sessile, cylindric-clavate, 70–75 × 7–8μ, 8-spored, pore blued by Melzer's reagent; ascospores uniseriate, or biseriate at the tip of the ascus, elliptic-cylindric, nonseptate, 10–14 × 3·5–4·5μ, paraphyses cylindrical, enlarged to 2–3μ wide above. On dead leaves of *Notofagus cunninghami*. Fig. 12.

Tasmania: unlocalised, typus in Herb. Tasmanian Museum.

This fungus obviously cannot be referred to *Mollisia* or to any genus of Dermateaceae and seems to find its natural position beside *Pezizella punctoidea* (Karst.) Rehm. It lacks the basal ring of dark brown cells found in many species of *Calycellina*.

Calycella striata (*Rodway*) *Dennis*, comb. nov.

Helotium striatum Rodway in Pap. & Proc. Roy. Soc. Tasmania **1920,** 155 (1921).

Helotium microsporium Rodway op cit., 155 (1921).

Apothecia scattered, superficial, cupshaped, sessile on a small base or with a basal peg penetrating a short distance into the substrate; disc flat or concave, 1–2 mm. diameter, whitish, drying yellow; receptacle smooth, sooty brown below, paler and shading into yellow towards the incurved margin, which may be slightly striate with lighter and darker vertical lines. Flesh thick, white, firm, with a thin sooty-brown rind. Excipulum composed throughout of subparallel, undulating, hyphae with lumen 1·5–2μ wide and thick, glassy, colourless walls, terminal cells filled with dark brown granular matter to form the thin dark rind of the receptacle; subhymenium sharply differentiated, about 50μ thick, composed of loosely packed thinwalled hyphae. Asci cylindric-clavate, about 40–45 × 5–6μ, 8-spored, the minute pore blued by Melzer's reagent; ascospores uniseriate or biseriate above, broadly elliptical, hyaline, 4·5–6 × 2–3μ; paraphyses slender, cylindrical. On decorticated wood. Fig. 13.

Tasmania: Cascades, Hobart, Aug. 1919, typus of *H. striatum*; July 1919, typus of *H. microsporium*, both in Herb. Tasmanian Museum.

The only difference I can see between *H. striatum* and *H. microsporium* is that in the apothecium of the former examined the entire flesh is composed of undulating hyphae with thick glassy walls, whereas in that of *H. microsporium* this '*Calycella*' structure is confined to the flanks of the hymenium and the outermost layer of the receptacle, the remainder of the flesh being composed of irregularly arranged thinwalled cells 6–20μ across. In view of the complete agreement of the two collections in all other characters I feel this difference in structure of the flesh is probably due to the apothecia having

been collected at different stages of growth and is not a specific character. The difference in spore size indicated by Rodway is not borne out by his material. Dried apothecia of *C. striata* bear a striking superficial resemblance to those of *Chlorosplenium chlora* but the two species have quite different excipular structures as well as different shaped ascospores.

FIG. 13. *Calycella striata.* Apothecium × 20, section × 660.

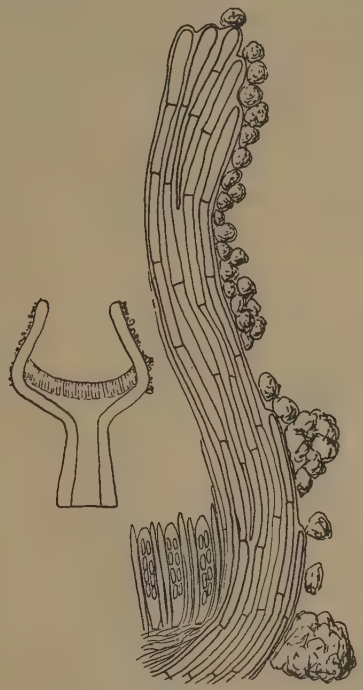

FIG. 14. *Phialea epitephra.* Diagrammatic section × 80, section of margin × 660.

Phialea epitephra (*Berk.*) *Dennis*, comb. nov.

Peziza epitephra Berk. apud Hooker, Flora Tasmaniae **2,** 275 (1860).

Tapesia epitephra (Berk.) Sacc., Sylloge Fungorum **8,** 381 (1889).

Apothecia scattered, superficial; disc concave, about 0·25 mm. diameter, drying yellowish, deeply sunk between the erect sterile margins; receptacle goblet shaped, pure white, pruinose, with a short slender stalk. Excipulum composed of parallel hyphae with thick hyaline walls, outer surface coated with irregularly rounded glassy matter, presumably calcium oxalate; subhymenium thin, formed of slender thinwalled hyphae. Asci subsessile, cylindric-clavate, 25 × 3μ, 8-spored, the minute pore blued by Melzer's reagent; ascospores biseriate, cylindric-fusiform, 2·5 × 1μ; paraphyses numerous, cylindrical, 1·5μ wide. Seated on spiral hairs on the under surface of dead leaves of *Bedfordia Salicina* DC. (Compositae). Fig. 14.

TASMANIA: unlocalised, leg. *Archer.*

The 'uniform brown stratum consisting of even curled brown threads', to which Berkeley referred in his diagnosis, consists of spiral hairs of the host. Saccardo was thus quite mistaken in transferring the species to *Tapesia* and also in his alternative suggestion that, as Berkeley did not see asci or spores, it might be a *Cyphella*. The fungus on rotten wood to which Rodway applied the name *Tapesia epitephra* has nothing in common with Berkeley's species, which is a typical *Phialea* in the sense of von Höhnel and of Nannfeldt. Rodway's fungus is an *Arachnopeziza* sensu Korf, near *A. eriobasis* (Berk.) Korf, but with smaller spores, 5–6 × 1μ and nonseptate. It differs from *Eriopezia caesia* (Pers. ex Fr.) Rehm in its hyaline celled excipulum as well as its narrower spores. The material in Rodway's herbarium is not well enough preserved to be described in detail.

I am indebted to Mr. V. Summerhayes for suggesting the identity of the type host and to Mr. Richardson for confirming this by anatomical studies.

FIG. 15. *Cyathicula multicuspidata.* Apothecium × 70, marginal tooth in surface view, ascus, paraphyses and spores × 660.

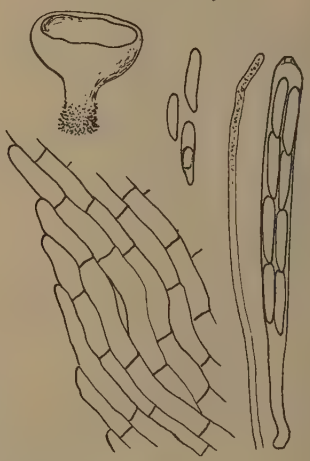

FIG. 16. *Helotium pezizoideum.* Apothecium × 10, outer layers of excipulum, spores, ascus and paraphysis × 660.

Cyathicula multicuspidata Rodway in Pap. & Proc. Roy. Soc. Tasmania **1920,** 154 (1921).

Apothecia scattered, superficial; disc up to 0·5 mm. diameter, concave, white; receptacle cupshaped, sessile on a small base, white, smooth but prolonged at the margin into long triangular membranous teeth, which curve over the disc when dry. Excipulum composed of parallel hyphae with thick hyaline walls; asci cylindric-clavate 35–40 × 4μ, 8-spored, pore not blued by Melzer's reagent; ascospores biseriate, elliptic-fusiform, 7–9 × 1–1·25μ; paraphyses filiform, obtuse, 1μ thick. On decaying rachis of *Dicksonia.* Fig. 15.

TASMANIA: Gordon, Nov. 1905, Typus in Herb. Tasmanian Museum.

Helotium pezizoideum *Cooke & Phillips* in Grevillea **19,** 72 (March 1891).

Apothecia scattered, superficial; disc slightly concave, ochraceous, up to 2 mm. across; receptacle slightly paler, shallow cupshaped, smooth, with a short, stout stalk, usually strigose with white hairs towards the base. Excipulum of slightly undulating parallel hyphae, 5–6μ wide, lying at a moderate angle to the surface. Asci cylindric-clavate, 70–90 × 6–7μ, 8-spored, the pore only faintly blued by Melzer's reagent; ascospores biseriate, cylindric-clavate, tapering below, straight or slightly curved, 10–14 × 2·5–3μ. Paraphyses cylindrical, not enlarged at the tips, 2μ thick, with granular contents. On decorticated wood.

New Zealand: Waitaki (Typus). Fig. 16.

Queensland: unlocalised, *Langdon* 1460, 21.3.1954.

This is clearly a member of the *H. calyculus–H. conscriptum* series but is probably worth maintaining as a distinct species because of its narrower ascospores and rather shorter asci.

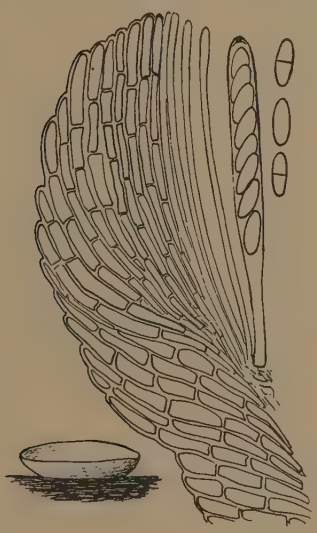

Fig. 17. *Helotium brevisporum.* Apothecium × 7, section of margin and free spores × 660.

Fig. 18. *Helotium ceratinum.* Apothecium × 15, excipular cells in surface view and spores × 660.

Helotium brevisporum *Cooke & Phillips* in Grevillea **8,** 63 (Dec. 1879).

Apothecia scattered, superficial, subsessile; disc flat, up to 3 mm. across, ochraceous, with a low obtuse margin; receptacle saucer-shaped, paler than the disc, smooth, with a short stout stalk, largely immersed in the substrate. Excipulum of parallel hyphae lying at a moderate angle to the surface, 4–5μ wide, with rather thick hyaline walls; flesh of loosely woven hyaline hyphae, stained brown in the base of the stalk only. Asci cylindric-clavate, about 75 × 6μ, 8-spored, pore blued by Melzer's reagent; ascospores uniseriate, elliptical, 8–12 × 3–4μ, becoming 1-septate. Paraphyses cylindrical, 2μ wide. On decorticated wood.

New Zealand: Waitaki, S. Berggren 30b (Typus). Fig. 17.

Helotium ceratinum (*Berk.*) *Dennis*, comb. nov.

Peziza ceratina Berk. apud Hooker, Flora Tasmaniae **2,** 275 (1860).

Phialea ceratina (Berk.) Sacc., Sylloge Fungorum **8,** 267 (1889).

Apothecia scattered, superficial; disc scarcely 1 mm. across, flat; receptacle funnel-shaped, smooth, very soft, now light brown, seated on a long, slender, cylindrical, smooth, concolorous stalk. Excipulum composed of large, delicate, thin-walled cells, about 15–25 × 7–12μ, in rows almost parallel to the surface. Asci clavate, about 110 × 10μ, iodine reaction uncertain, 8-spored; ascospores narrowly elliptical, 18–20 × 4–4·5μ. Paraphyses not clearly seen. On cladodes, probably of *Acacia* sp. Fig. 18.

Tasmania: leg. *Archer* (Typus).

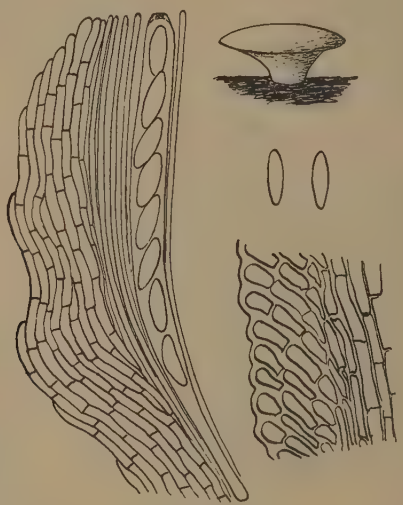

Fig. 19. *Helotium gratum.* Apothecium × 10, section of margin, spores and portion of excipulum from stalk × 660.

Massee (1901) was mistaken in his opinion that 'this species proves to be identical with *Helotium virgultorum* Karst.' The latter has larger, tougher apothecia, on dead twigs in Europe, and is generally regarded as a synonym of *H. calyculus* (Sow. ex Fr.) Fr., or at least as a member of the *H. calyculus* complex. In transferring the species to *Phialea* Saccardo was no doubt influenced by its long stalk and small stature but *P. ceratina* is not congeneric with *Phialea cyathoidea* (Bull. ex Fr.) Gill., the type species of *Phialea*. Its fresh colour is uncertain, some white species dry a similar brownish hue.

Helotium gratum (*Berk.*) *Cooke* in Grevillea **11,** 103 (March 1883).

Peziza grata Berk. apud Hooker, Flora Tasmaniae **2,** 275 (1860).

Apothecia scattered, superficial or partially inserted in the substrate; disc convex, reddish brown, dull orange according to Berkeley, about 1–2 mm. across, margin obsolete; receptacle thin, smooth, paler than the disc, stalk short, smooth, cylindrical, concolorous. Flesh formed of slender, hyaline, loosely woven hyphae; excipulum flanking the hymenium composed

of parallel hyphae 2–3μ wide, curving to lie parallel with the surface; that of the stalk consists of similar hyphae with a superficial layer of rather thicker short-celled elements lying irregularly or almost at right angles to the surface. Asci narrowly cylindric-clavate, up to 125 × 8μ, 8-spored, pore rather feebly blued by Melzer's reagent; ascospores uniseriate, elliptical, usually biguttulate, nonseptate, 10–13 × 3–4μ. Paraphyses slender, cylindrical, 1·5μ thick. On decorticated wood. Fig. 19.

TASMANIA: leg. *Archer* (Typus).

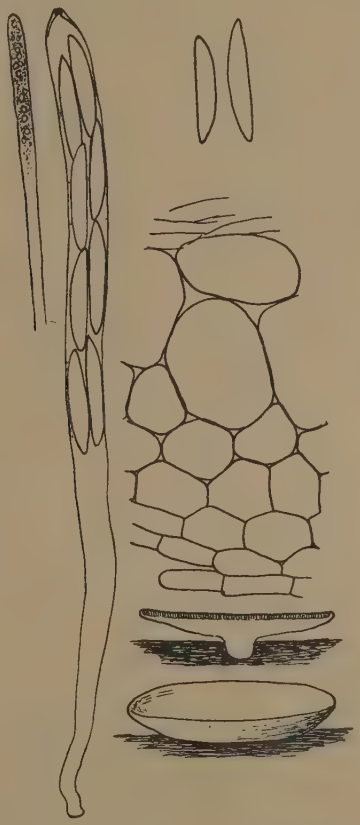

FIG. 20. *Helotium pateriforme*. Apothecium and diagrammatic section × 10, ascus, paraphysis, spores and portion of excipulum from under side of receptacle × 660.

Helotium pateriforme (*Berk.*) *Cooke* in Grevillea **11,** 102 (March 1883).

Peziza pateriformis Berk. apud Hooker, Flora Tasmaniae **2,** 276 (1860).

Mollisia verrucosa Rodway in Pap. & Proc. Roy. Soc. Tasmania **1924,** 102 (1925).

Apothecia scattered, superficial, subsessile; disc flat, pale straw colour drying ochraceous up to 5 mm. across; receptacle saucer-shaped, smooth, concolorous towards the margin, dark brown below, with a small stem-like base immersed in the substrate. Flesh composed of loosely woven hyphae,

some with light brownish walls; excipulum relatively thin in the lower part of the receptacle, formed of broadly elliptical to subglobose thinwalled cells, up to 30 × 20μ, covered externally by one or two rows of short-celled hyphae, 5μ wide, which are brown-walled on the stem-like base, elsewhere almost hyaline, marginal portion of excipulum composed of similar but uncoloured hyphae throughout. Asci cylindric-clavate, 170–180 × 9 10μ. 8-spored, the small pore blue in Melzer's reagent; ascospores biseriate, elliptic-fusiform, 23–28 × 4–5μ, nonseptate; Paraphyses cylindrical, 4μ wide, filled with brownish granules. On decorticated wood and dead sticks. Fig. 20.

Tasmania: leg. *Archer* (Typus); Marriotts Falls, June 1924, L. Rodway (Typus of *M. verrucosa*).

Massee (1896) found even larger ascospores, 27–30 × 7–8μ, with a tendency to become 1-septate at maturity. In structure *H. pateriforme* agrees with *Helotium uliginosum* var. *cortisedum* (Karst.) Karst., see Dennis (1956), but with much larger ascospores. Massee cited *Helotium aglaeosporum* Berk 1875, on rotten wood in North America, as a synonym of *H. pateriforme*. It certainly has a similar structure but in the sole remaining apothecium I have failed to find entire asci or spores. According to Berkeley's notes the latter were 1/1,500–1/750 inch long, converted in the published diagnosis to ·0013–·0006, i.e. 33–15μ, not 8–15μ as given by Saccardo! In view of the close relationship between the Australian and North American fungus floras Massee's suggestion is by no means impossible but the bad state of the type of *H. aglaeosporum* makes it advisable to suspend judgement until fresh collections resembling *H. pateriforme* are produced from the Carolinas.

Helotium tasmanicum *Rodway* in Pap. & Proc. Roy. Soc. Tasmania **1920,** 155 (1921).

This differs from *H. pateriforme* only in its smaller ascospores, 12–18 × 4μ, in asci 155 × 8μ. In this it agrees with *H. gratum* which, however, apparently differs in shape and excipular structure.

Tasmania: on decorticated wood, Cascades, Hobart, Oct. 1919, typus in Herb. Tasmanian Museum.

Phialea byssogena (*Berk.*) *Sacc.*, Sylloge Fungorum **8,** 267 (1889).

Peziza byssigena Berk. apud Hooker, Flora Tasmaniae 2, 275 (1860).

Only one immature apothecium remains on the type collection. From this I have been unable to obtain asci but its excipular structure is clear, composed of parellel thinwalled hyphae 5μ wide, therefore that of a *Helotium* or *Pezizella*, not that of a *Phialea*. Massee's (1901) statement 'this species is identical with *Helotium aureum* Pers.' reflects his misconception of the latter species. As I have shown elsewhere, the true *H. aureum* Pers. is the stilbaceous fungus commonly called *Dendrostilbella baeomycioides* (Massal.) Lindau, which is confined to resinous exudations from conifers. According to Berkeley the ascospores of *P. byssigena* were elliptic-cylindric, 1/3000 inch long, i.e. 8·5μ, a little short for those of *Pezizella parile* (Karst.) Dennis, which is presumably the fungus Massee had in mind and which it does in general closely resemble. The basal mycelium to which Berekley referred and which inspired the name may not be connected with the apothecia.

Phaeohelotium recurvum (*Rodway*) *Dennis*, comb. nov.

Cenangium recurvum Rodway in Proc. Roy. Soc. Tasmania **1924,** 95 (1925).

Apothecia superficial, disc flat, up to 6 mm. diameter, 'bright yellow brown', receptacle obconical, narrowed to a short stem-like base, smooth, straw-coloured. Flesh composed of closely packed thinwalled hyphae, excipulum about 70μ thick, formed of thinwalled–globose cells 15–20μ diameter. Asci cylindric-clavate, 115 × 9μ, 8-spored, pore blued by Melzer's reagent; ascospores uniseriate, elliptic-fusiform or slightly ovoid, non-septate, hyaline, 10–12·5 × 4–4·5μ; paraphyses cylindrical, 2μ thick. Apparently growing amongst moss on very rotten wood. Fig. 21.

Tasmania: Bellerive, Aug. 1920.

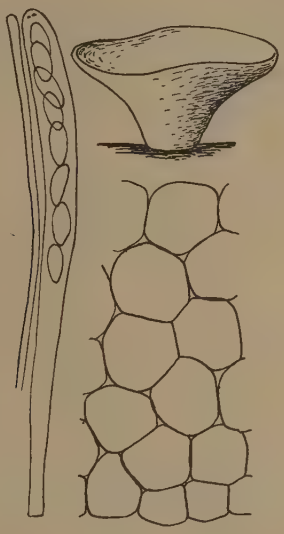

Fig. 21. *Phaeohelotium recurvum*. Apothecium × 5, ascus, paraphysis and excipular cells × 660.

The substrate was not indicated in the diagnosis but the bases of the apothecia in the type packet bear what appear to be fragments of rotten wood amongst grains of sand. The diagnosis was clearly based primarily on the above collection, which was marked 'Type' by Rodway, but the published spore size, 12–16 × 4–7μ, was extended to cover a second collection, Mt. Field, Dec. 1910, which is probably to be referred to another species.

Chlorociboria aeruginosa (*Oeder ex Fr.*) *Seaver* in Mycologia **28,** 391 (1936).

Apothecia scattered or in small clusters; disc concave, then convex, up to 3 mm. across, green, then yellow; receptacle cup-shaped, minutely pruinose, bright blue-green, stalk short, cylindrical, concolorous. Flesh white, spongy, formed of very loosely woven hyaline hyphae 2μ wide; excipulum a very thinwalled pseudoparenchyma with hyaline angular cells 5–10μ, diameter, bearing a pallisade of closely packed, short, cylindrical, simple or forked, bright blue-green hairs. Asci soft and delicate, 80–105 × 8–9μ, 8-spored,

pore deep blue in Melzer's reagent; ascospores biseriate, elliptic-cylindric, 11–15 × 2·5–3·5μ; paraphyses cylindrical 2μ thick. On decorticated green-stained wood.

New Zealand: Auckland.

Australia: Toowoomba, leg. *Hartman* F 58.

This is *C. aeruginosa* in the sense of Nylander, Karsten and Rehm but not that of British authors, which is the smaller-spored fungus named *Peziza aeruginascens* by Nylander. Which of these two is the genuine *Elvella aeruginosa* of Oeder figured in Florae Danicae 1770 it is now impossible to discover. The type locality was in Iceland but Larsen, in listing *C. aeruginosa* from that country, does not say whether it is the large-spored or small-spored fungus that is indicated. Rodway's (1925) description makes it clear that it was the species with ascospores 10–14 × 3μ that he found on stained wood in Tasmania. *Chlorociboria versiforme* (Pers. ex Fr.) Seaver has similar asci and ascospores but has more olive-coloured apothecia with less defined stalks, brownish flesh and excipular hairs that dry yellow.

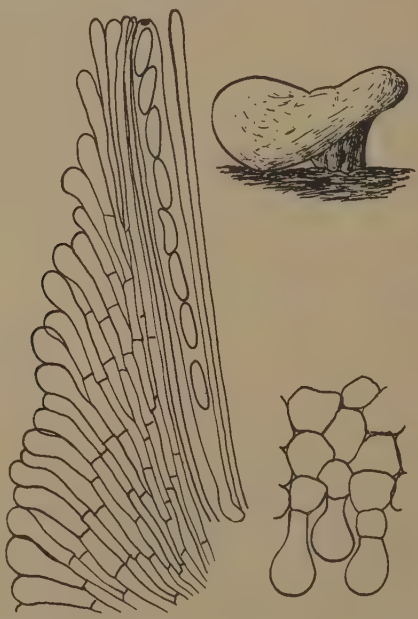

Fig. 22. *Chlorociboria versiforme* var. *olivacea*. Apothecium × 8, section of margin and of outer layers of excipulum from under side of receptacle × 660.

Chlorociboria versiforme (*Pers. ex Fr.*) *Seaver* var. olivacea (*Rodway*) *Dennis*, comb. nov.

Ciboria olivacea Rodway in Pap. & Proc. Roy. Soc. Tasmania **1924,** 105 (1925).

Apothecia solitary or in small clusters, superficial; disc convex or repand, olive-green, drying black, up to 5 mm. diameter; receptacle obconical with a short, stout, longitudinally furrowed base, pruinose throughout with minute, downy, blackish-brown hairs. Flesh composed of tightly woven hyphae, light brown in section, subhymenium thin, dark brown; excipulum-

dark brown, that of the stalk composed of undulating short-celled hyphae, approximately at right angles to the surface, that on the under side of the receptacle appearing pseudoparenchymatous in section, with angular, thin-walled, brown cells 10–15μ across, that on the flanks of the hymenium composed of brown, parallel, slender hyphae, with clavate terminal cells. Excipular hairs short, thinwalled, brown, with rounded and swollen tips about 10μ across. Asci narrowly clavate-cylindric, 115 × 6μ, 8-spored, pore blued by Melzer's reagent; ascospores uniseriate, elliptic-cylindric or slightly allantoid, 10–12 × 2·5–3·5μ; paraphyses cylindrical, slightly enlarged to 3μ at the tip. On dead wood, not stained green. Fig. 22.

TASMANIA: National Park, June 1924, typus in Herb. Tasmanian Museum.

The only differences between this and typical *C. versiforme* of Europe are that the apothecia are more uniform and less prone to unilateral growth and that the downy surface of the receptacle does not dry sulphur yellow. There are, however, irregular masses of bright yellow oily matter scattered throughout the flesh of the apothecia.

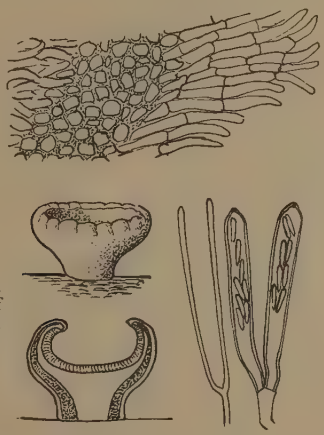

FIG. 23. *Chlorosplenium chlora*. Apothecium and diagrammatic section × 10, section of excipulum from under side of cup, asci and paraphyses × 660.

Chlorosplenium chlora (*Schwein.*) *Massee* in Journ. Linn. Soc. Bot. **35,** 116 (1901).

Peziza chlora Schwein. in Schrift. d. Naturf. Ges. zu Leipzig **1,** 122 (1822).

Chlorosplenium schweinitzii Fr., Summa Veg. Scand. Sect. Post., 356 (1849).

Peziza crocitincta Berk. & Curt. in Grevillea **1,** 6 (1872).

Pezizella crocitincta (Berk. & Curt.) Sacc., Sylloge Fungorum 8, 286 (1889).

Apothecia scattered or gregarious, subsessile, disc concave, 1–2 mm. across, bright yellow, drying ochraceous; receptacle cupshaped, glabrous, though the margin is often vertically ribbed and furrowed when dry, yellow at the margin, shading to dark brown below and in the short stem-like base. Flesh composed of closely woven pale hyphae, about 2·5μ wide, inner excipulum a zone of brown pseudoparenchyma which is replaced towards the outside by a narrow zone of paler subparallel hyphae lying at a high

angle to the surface and with free hyphal tips. Asci cylindric-clavate, short-stalked, 40–50 × 6μ, 8-spored, the minute pore blued by Melzer's reagent; ascospores irregularly biseriate, narrowly fusiform-clavate, 6–7 × 1–1·5μ; paraphyses filiform, 1μ thick, with unthickened rounded tips, branched below. The tissues yield a lemon yellow colour in KOH solution. On decorticated wood. Fig. 23.

New South Wales: Blue Mountains, May 1915, leg. *J. B. Cleland.*

The type collection of *P. crocitincta* looks to the unaided eye rather like an *Orbilia* but the paraphyses are not capitate, the asci and ascospores match those of *C. chlora*, and I think the tradition, beginning with Peck, which regards it as a synonym of the latter is correct. Seaver (1951) is, however, mistaken in suggesting that *Peziza pomicolor* Berk. & Rav. may be another synonym. *Chlorosplenium chlora* is a common species in North America but is apparently unknown in Europe. Its occurrence in New South Wales is thus a further indication of the American rather than Eurasian affinities of the Australian fungus flora, a circumstance which might be more easily understood if we knew a little more of the fungi of far eastern Asia. In microscopic characters this fungus is not so very unlike *Chlorociboria aeruginascens* (Nylander) Kanouse and as yellow pigment occurs in *Chlorociboria versiforme* it seems the genera *Chlorosplenium* and *Chlorociboria* are not as diverse as Seaver supposed, when he proposed the latter.

Discinella terrestris (*Berk. & Br.*) *Dennis*, comb. nov.

Helotium terrestre Berk. & Br. in Trans. Linn. Soc. London, ser. 2, **2,** 69 (March 1883) non *H. terrestre* Feltg. in Recueil Mem. Trav. Soc. G.D. Bot. Luxembourg **15,** 63 (1902).

Dasyscypha terrestris (Berk. & Br.) Sacc., Sylloge Fungorum 8, 468 (1889).

Phaeopezia ochracea Massee & Rodway in Kew Bull. **1901,** 159 (1901).

?*Aleurina readeri* Rehm in Ann. Mycol. **6,** 324 (1908).

Aleurina ochracea (Massee & Rodway) Rodway in Proc. Roy. Soc. Tasmania **1924,** 117 (1925).

Apothecia up to 1 cm. diameter, disc flat, pale ochraceous to orange, margin rather prominent, crenate; receptacle shallow cup-shaped, white, minutely downy, seated on a short cylindrical stalk. Flesh white, composed throughout of undulating hyphae about 4μ wide, which lie parallel towards the surface where their free tips protrude as short, hyaline, obtuse, smooth-walled hairs up to about 30 × 4μ. Asci cylindrical, long-stalked, about 200–225 × 10–14μ, with truncate tips in which the broad pore becomes outlined in blue by Melzer's reagent, 8-spored; ascospores elliptic-fusiform, their ends usually slightly apiculate, 14–25 × 7·5–9μ, 2–4 guttulate, wall smooth, at first hyaline but ultimately becoming brown. Paraphyses narrowly cylindrical, about 2μ thick, rounded at the tips. On soil. Fig. 24, left.

Queensland: on damp earth, Brisbane, leg. *F. M. Bailey* 299 (Typus).

New South Wales: Paramatta, 10.7.1912, J. B. Cleland; Kurrajong Heights, 19.8.1912, *J. B. Cleland*; National Park, Sydney, in sand, 15.7.1916, *J. B. Cleland*; Fitzroy Falls 8.6.1919, *J. B. Cleland.*

South Australia: Meningie, on sandy soil amongst moss, July 1956, *L. D. Williams* 50; Aug. 1954, *L. D. Williams* s.n.; Port Lincoln, on ground

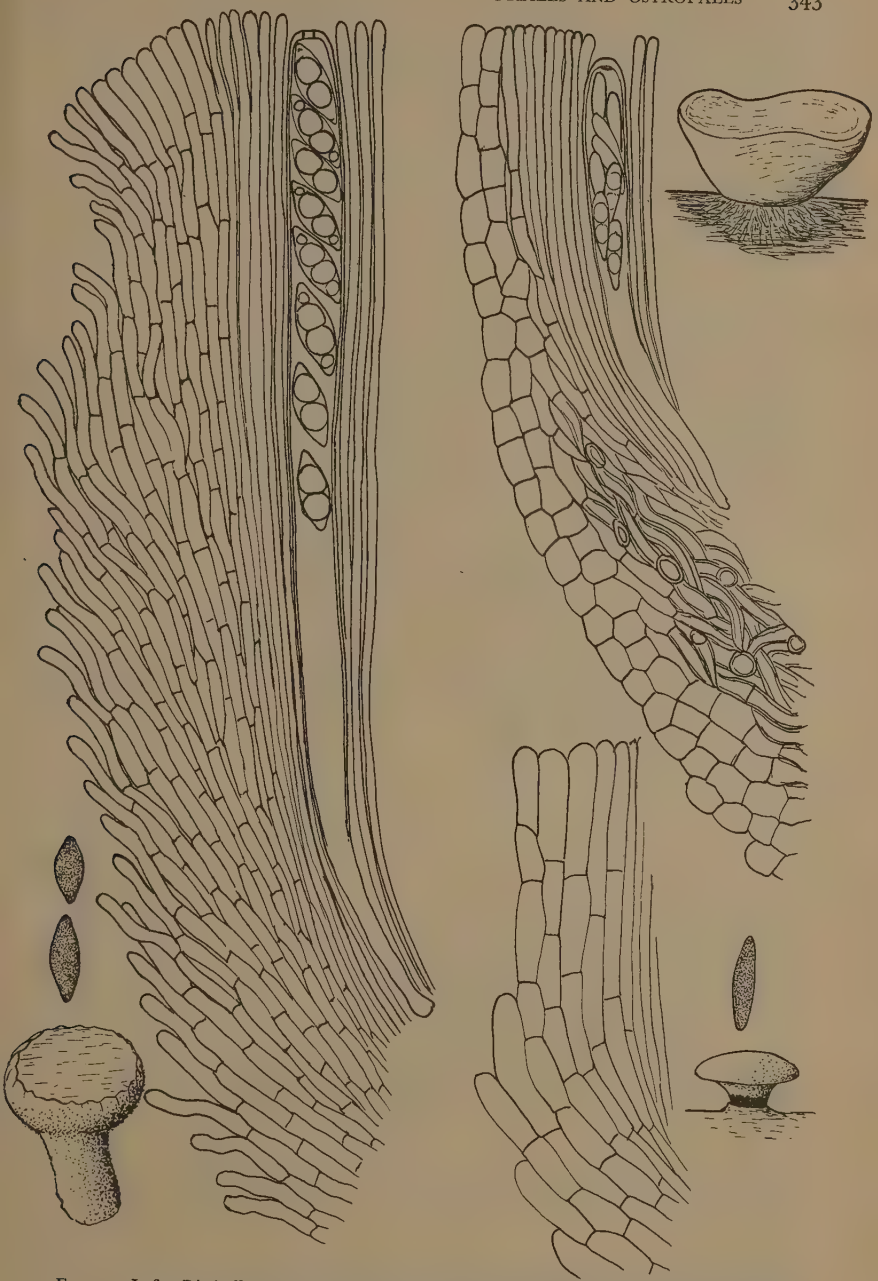

FIG. 24. Left. *Discinella terrestris*; upper right *Phaeohelotium flavum*; lower right, *Phaeociboria sejournei*; comparative studies showing habit, excipular structure and spores.

amongst moss, 16.7.1952, *N. T. Flentje*; Mt. Lofty, on bare soil, 13.7.1952; on wet soil 20.7.1952, both leg. *C. G. Hansford.*

TASMANIA: Cascades, Rodway 650 (Typus of *P. ochracea*).

I have not seen the type of *A. readeri*, from Folett County, Victoria, and refer it to *D. terrestris* from the description only. Both in its excipular structure and hymenial characters, as well as in its terrestrial habit, this common Australian fungus agrees well with European species of *Discinella*. It differs from them in its ascospores ultimately becoming brown and the genus to which it is referred will depend on the weight one lays on this character. I am inclined not to stress it and to consider our fungus more closely akin to *Discinella* than to the type species of the rather similar genera with brown ascospores, *Phaeohelotium* and *Phaeociboria*, which are illustrated with it in Fig. 24. The type species of the former, *P. flavum* Kanouse, has a thin but distinct cellular excipulum enclosing the prosenchymatous flesh. As the brown colour in the ascospore wall develops tardily and is probably not in itself a good generic character, *Phaeohelotium* would appear to provide a generic name for such species as *Pachydisca nobilis* (Vel.) Le Gal, *P. umbilicata* Le Gal, *Helotium citrinum* var. *turfaceum* (Karst.) Karst. and *Helotium lutisedum* (Karst.) Karst. all with yellow subsessile apothecia on rotten wood or humus and with a thin cellular excipulum covering a flesh of interwoven hyphae. Madame Le Gal (1953) has shown that the type species of *Pachydisca* Boud., to which two of them have been referred, is a *Rutstroemia*. The type species of *Phaeociboria* von Höhnel, *P. sejournei* (Boud.) v H., as represented by Jaäp, Fungi selecti exsiccatti 501, is a softer fleshed fungus growing on plant tissue. In spite of its rather similar excipular structure and similarly shaped brown ascospores it is probably to be maintained in a different genus from *D. terrestris*. I am indebted to Miss Kanouse for authentic material of *P. flavum* for comparative studies.

Velutarina rufo-olivacea (*Alb. & Schw. ex Fr.*) *Korf* in Mycologia **45,** 476 (1953).

Peziza rufo-olivacea Alb. & Schw. ex Fr., Syst. Myc. **2,** 99 (1822).

Dasyscypha ovina Rodway in Pap. & Proc. Roy. Soc. Tasmania **1920,** 156 (1921).

The type collection of *Dasyscypha ovina* Rodway shows this species to have been based on quite typical material of the cosmopolitan *Velutarina olivacea*. It is surprising that Rodway did not recognise this for he noted most of the diagnostic characters, the peculiar mealy excipular cells, the olive-green tipped paraphyses and the brown colour of the mature ascospores. He overlooked the very characteristic elliptic green cells scattered through the flesh though they are abundant in his material. *V. rufo-olivacea* has been often figured, best in Boudier's brilliant plate Icon. mycol. 558.

TASMANIA: Cascades, Hobart, on dead bark, Aug. 1918, typus of *D. ovina*.

Encoelia toomansis (*Berk. & Br.*) *Dennis* in Kew Bull. **1957,** 398 (1958).

Tympanis toomansis Berk. & Br. in Trans. Linn. Soc. London, ser. 2, **2,** 222 (1887).

Recent collections of this beautiful species were briefly cited by Dennis (1958) and the opportunity may now be taken to describe and figure its distinctive anatomical characters.

Apothecia gregarious, about 2 mm. diameter, presistently cup-shaped, with strongly inrolled margin and long cylindrical stalk; receptacle and stalk dark brown to blackish, ornamented in the upper part with a white meal, which almost completely conceals the surface around the margin; disc gray, persistently concave; flesh whitish, with a darker core and blackish rind, hard when dry, leathery when soaked up. Flesh of the receptacle three-layered, central core composed of closely compacted subparallel hyphae about 2·5μ wide, with thin walls and brownish finely granular contents; intermediate layer with very slender, subhyaline, much branched hyphae, 1–1·5μ thick, sparsely distributed through a firm, colourless, gelatinous matrix and curving outwards towards the surface; rind two or three cells thick, individual cells subglobose, 6–9μ diameter, with dark brown walls, running out on the upper part of the receptacle into cylindrical, sparsely septate, subhyaline hairs about 4μ thick. Subhymenium thin and poorly differentiated; hymenium with numerous, slender, cylindrical, septate paraphyses, 1μ thick, embedded in a firm, light brownish, gelatinous matrix; asci not clearly seen, cylindrical, about 4μ wide, apparently unstained by iodine, with at least 4, possibly 8, ascospores. Ascospores elliptic-cylindric, hyaline, 6–10 × 2·5–3μ. On old cones of *Banksia* sp. Fig. 25.

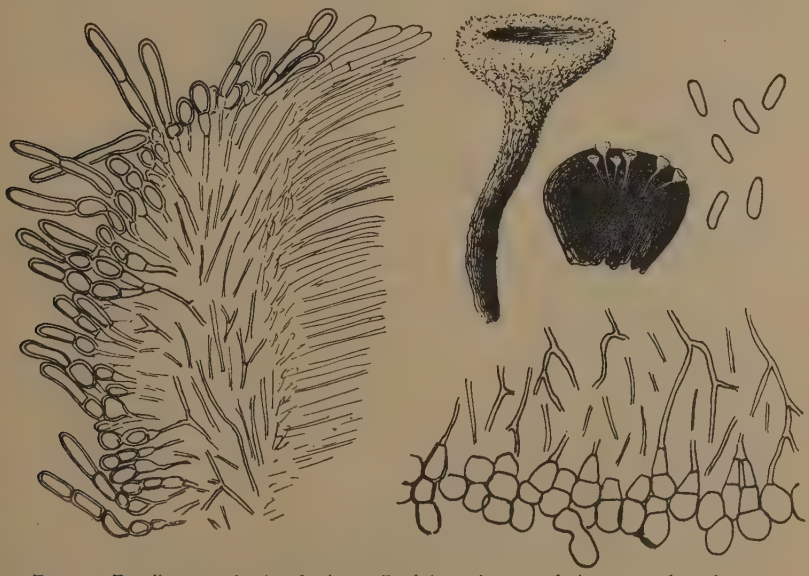

FIG. 25. *Encoelia toomansis*. Apothecia on Banksia scale natural size, one enlarged × 12, spores, section of margin and of excipulum on under side of cup × 660.

Collections made in September were immature, with only young asci beginning to appear between the paraphyses; that made in June 1957 was obviously over-mature, with its ascospores almost all discharged and the asci effete. This accounts for the uncertainty expressed regarding the ascospore number and it is also possible that the measurements cited, made on free ascospores from the hymenial surface, will be found to be rather in excess of those made on ripe ascospores in undischarged asci. The fungus appears to be

adapted to a very dry habitat and differs from other species of *Encoelia* and *Cordierites* in its gelatinous flesh and hymenium, as well as in the well developed submarginal hairs. The flesh yields no trace of the coloured solution with KOH characteristic of *Ionomidotis*. Nothing is known of the life history of the species or of its relationship with the host. In general appearance *E. toomansis* rather closely resembles *Dasyscyphus pulveraceus* (Alb. & Schw. ex Fr.) but the latter lacks the sharply differentiated cellular rind characteristic of *Encoelia*.

Rutstroemia macrospora (*Peck*) *Kanouse* in Canadian Journal of Research **18,** 547 (1940).

Helotium macrosporum Peck in Ann. Rept. New York State Mus. **26,** 82 (1874).

Apothecia solitary or in small clusters, disc up to 1·5 cm. diameter, flat, pale greyish-white, margin obsolete; receptacle thin, smooth, grey, seated on a short central stalk. Flesh composed of loosely woven hyaline hyphae 3–4μ wide; excipulum about 50μ thick, with parenchymatic cells up to 20 × 16μ, with thin brown walls, superficial cells often narrower and subcylindric. Asci slightly clavate, 140–195 × 14μ, pore blued by Melzer's reagent, 8-spored; ascospores irregularly biseriate, elliptic-fusiform or slightly curved, 28–40 × 5–7μ, hyaline, continuous, becoming up to 3-septate at maturity and budding spherical spermatia; paraphyses cylindrical, obtuse rounded, 3μ wide, with oily contents. On rotting logs of *Eucalyptus*.

Victoria: Hume ridge, Wallaby Creek, *Melville* 3945.

This is a common species in North America and has an extensive synonymy which may be consulted in White (1941).

Rutstroemia lanaripes *Dennis*, spec. nov.

Apothecia superficialia, sparsa, stipitata, convexa, atra, 4–10 mm. diam. ; receptaculum radiatim striolatim, margine obtusi, laevi; stipes tenuissimus; excipulis hyphis compactis, parallelis, 3–4μ diam., brunneis, efformantibus ; asci clavato-cylindracei, 115–125 × 8μ, octospori; ascosporae uniseriatae, unicellulares vel 1–3 septatae, 13–17 × 3·5–4·5μ; paraphyses angustae, simplices, apice subclavatae 2μ diam. Fig. 26.

Tasmania: on rotting wood, leg. *Archer*, in herb. Berkeley as *Peziza lanaripes* but published by him as *P. firma*; Falls track, 13.4.1897 (Typus); Cascades, July 1920; May 1924, all in herb. Tasmanian Museum as *Ciboria firma*, leg. *L. Rodway*.

Berkeley, Cooke and Rodway all published this fungus as *Peziza firma* Pers. ex Fr., i.e. *Rutstroemia firma* (Pers. ex Fr.) Karst., from which it differs in its slaty black colour, simple excipular structure and occurrence on rotting wood instead of on twigs of *Quercus*. According to Rodway's notes and paintings the fresh apothecia are almost black throughout but in dried specimens the under surface of the receptacle and the lower part or whole of the stalk tend to become reddish-brown and the base of the stalk appears downy. The flesh is dark brown throughout, contrasting with the hymenium which appears subhyaline in section, the brown colour appears to be supplied largely by granules encrusting the hyphae. Secondary spores, so characteristic of *R. firma*, have not been observed in *R. lanaripes*.

Coryne tasmanica (*Rodway*) *Dennis*, comb. nov.

Cenangella tasmanica Rodway in Pap. & Proc. Roy. Soc. Tasmania **1920,** 156 (1921).

Apothecia gregarious, superficial, disc flat or convex, black, 1–5 mm. diameter; receptacle saucer-shaped, sessile on a broad base, smooth, black, margin often undulating. Flesh composed of closely packed hyaline hyphae, 4–5μ wide, with thick, glassy, subgelatinised walls, passing at the margin into a narrow belt of thinwalled parallel hyphae. Excipulum of angular isodiametric cells, those of the inner zone thinwalled, those of the outer layers about 5μ diameter and thick-walled, sheathed towards the base of the

Fig. 26. *Rutstroemia lanaripes*. Apothecium natural size, ascus, paraphysis and spores × 660.

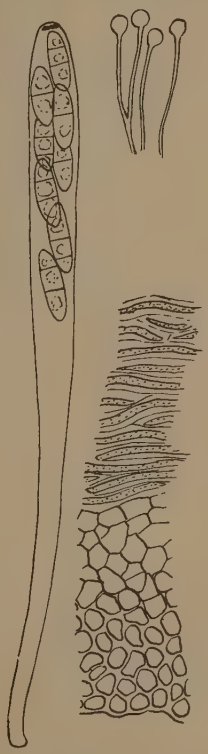

Fig. 27. *Coryne tasmanica*. Ascus, paraphysis and section of excipulum × 660.

receptacle by a zone of very slender hyphae, about 1μ wide, closely packed in a gelatinous matrix. Asci narrowly cylindric-clavate, 170× 10–12μ, 8-spored, with massive apical ring stained blue by Melzer's reagent; ascospores uniseriate, sometimes becoming biseriate at the tip of the ascus, elliptic-fusiform, 12–17 × 5μ, hyaline with oily contents, becoming 1–3-septate; paraphyses very slender, abruptly enlarged above into subglobose tips 3–4μ across, not cemented into an epithecium. On dead wood. Fig. 27.

Tasmania: near Fern Tree, May 1912, *L. Rodway*, Typus in Herb. Tasmanian Museum.

There are odd discrepancies in Rodway's two published descriptions of this species. In the original diagnosis the apothecia are black and the spores 'light purple when mature'. In his revised description of 1925 the apothecia are purple and the spores hyaline. The type packet bears a pencil note under the sketch of a spore 'Smooth, coat thick, light purple' followed by the comment in ink 'Subsequent exam. of dry material shows spores appear hyaline or slightly tinted'. The dried material now yields a purplish-brown stain in ammonia and any colour seen in the fresh spores was probably in the sap rather than in the spore wall. *Cenangella* Sacc. is currently regarded as a synonym of *Dermea* Fr. but *C. tasmanica* does not appear to be a typical *Dermea*. The apothecia would be very large for that genus, they are not obviously erumpent but superficial on very rotten decorticated wood and there is no associated conidial state. The flesh seems to have been rather less gelatinous than in the well known *C. sarcoides* of Europe, but in all other features the two species are very alike, especially if *C. tasmanica* was purple when fresh.

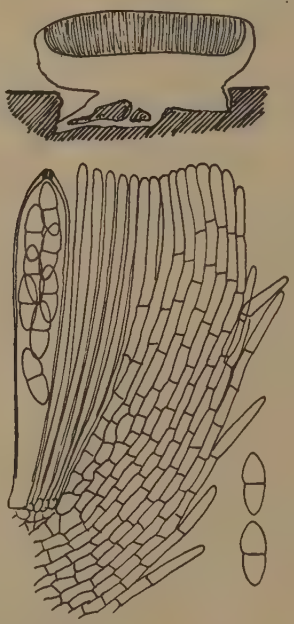

FIG. 28. *Pezicula sessilis*. Diagrammatic section × 60, section of margin and spores × 660.

Dermateaceae

Pezicula sessilis (*Rodway*), *Dennis*, comb. nov.

Helotium sessile Rodway in Pap. & Proc. Roy. Soc. Tasmania **1924,** 103 (1925).

Apothecia scattered, each on a small hyphal pad erumpent from the bark, discoid; disc flat or convex, up to 0·5 mm. diameter, pale ochre; receptacle slightly paler, minutely pruinose, sessile on a broad base. Excipulum composed of small, short, thinwalled cells, the terminal ones running out into free hair-like tips up to 18 × 3μ. Asci clavate, 70–95 × 12μ, 8-spored, with

massive apical ring blued by Melzer's reagent; ascospores usually biseriate, elliptic-fusiform, 1-septate and slightly constricted at the septa, 12–15 × 4–6μ; paraphyses cylindrical, 2μ wide. On bark of twigs. Fig. 28.

TASMANIA: Cascades, Hobart, 7.8.1898, typus.

This is certainly not a typical *Helotium*. In proposing to transfer it to *Pezicula* I have been influenced by the erumpent sessile habit and the relatively large asci with consistently septate ascospores. The convex bright coloured disc is also like that of a *Pezicula*, as is the friable consistency of dry apothecia.

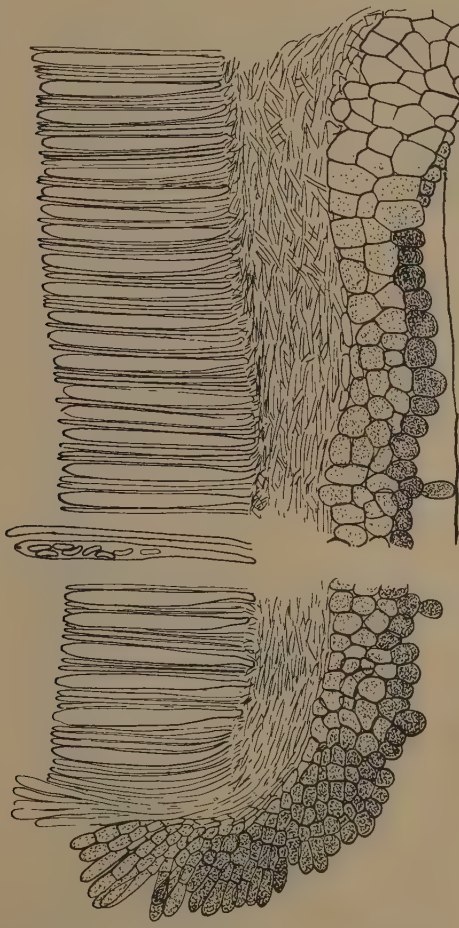

FIG. 29. *Mollisia sublividula*. Section of apothecium × 500, ascus and paraphysis × 660, from the Australian material.

Mollisia sublividula (Nyl.) Sacc., Sylloge Fungorum 8, 341 (1889).

Peziza sublividula Nyl. in Not. Sallsk. Fauna Flora Fennica 10, 61 (1869).

Apothecia gregarious, superficial but with a small peg-like base slightly inserted in the substrate. Disc up to 1 mm. across, flat and dark blue-gray

when moist, concave and dark yellowish-brown when dry; receptacle saucer-shaped, very dark brown to black, minutely downy, with a narrow white margin. Excipulum formed of thinwalled subglobose cells, for the most part 7–10μ across, 4–5 cells deep, the outermost layer very dark brown, inner layers paler, outer cells subcylindrical on the flanks of the receptacle, passing into distinct downy hairs, becoming progressively paler towards the margin where they are hyaline. A collar of larger, subhyaline, polygonal cells surrounds the peg-like base. Flesh thin, fibrous, composed of colourless hyphae. Asci very narrowly cylindric-clavate, about 50 × 4μ, 8-spored, pore minute but blued by Melzer's reagent; ascospores irregularly biseriate, narrowly cylindrical, often slightly curved, 4–6 × 1–1·5μ. Paraphyses cylindrical with rounded tips, about 2μ wide. On decorticated wood.

South Australia: Meningie, *L. D. Williams*, 9.7.1953, W.A.R.I. 3549. Fig. 29.

I am indebted to Madame Le Gal for most kindly confirming the identity of this rather scanty collection with *M. sublividula* as currently interpreted in Europe.

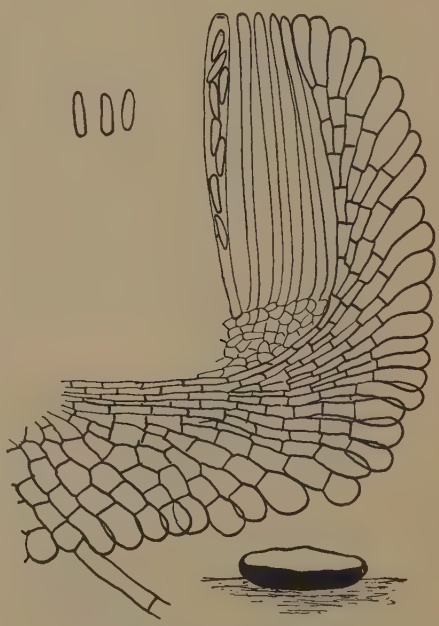

Fig. 30. *Mollisia ellipsospora*. Apothecium × 10, section and spores × 660.

Mollisia ellipsospora Rodway in Pap. & Proc. Roy. Soc. Tasmania 1924, 110 (1925).

Apothecia scattered, superficial; disc flat. 1–3 mm. across, straw yellow; receptacle discoid, sessile on a broad base, smooth, jet black throughout, margin flat, not incurved. Excipulum 30–40μ thick, formed of subglobose cells with thin dark brown walls arranged in radial rows, those towards the margin elongated with clavate terminal cells, dark brown right to the edge of the hymenium; flesh very thin formed of closely packed, slender, dark

brown hyphae; subhymenium thin, pale. Asci narrowly cylindric-clavate, 65–70 × 5μ, 8-spored, pore feebly blued by Melzer's reagent; ascospores uniseriate or a few biseriate above, elliptic-cylindric, non-septate, straight or very slightly curved, 8–10 × 2·5–3μ; paraphyses obtuse, hyaline, 3μ wide. On decorticated wood. Fig. 30.

TASMANIA: Cascades, Hobart, July 1920, typus in Herb. Tasmanian Museum.

This is the only collection in the *M. ellipsospora* packet and was labelled 'Type' by Rodway. I am unable to explain how he came to publish the spores at double their actual size, 16 × 6μ. The species is remarkable for the complete absence of a pale margin to the receptacle; in this and in its structure it recalls some of the forms referred to *Tapesia fusca* (Pers.) Fuck. A few dark brown anchoring hyphae are present on the under side of the apothecium.

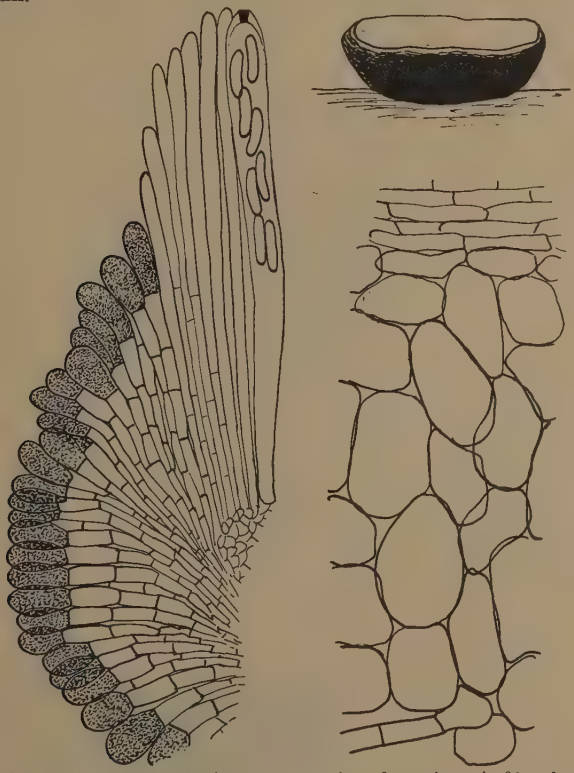

FIG. 31. *Mollisia ochronigra*. Apothecium × 10, section of margin and of basal excipulum × 660; the latter is dark-celled throughout.

Mollisia ochronigra *Rodway* in Pap. & Proc. Roy. Soc. Tasmania **1924,** 102 (1925).

Apothecia scattered, superficial; disc concave, 2–4 mm. diameter, light gray-brown; receptacle smooth, cupshaped, sessile on a broad base, dark

brown, almost black, rim broad, concolorous but with a narrow, light gray-brown, inner margin. Excipulum in the lower part of the receptacle about 100μ thick, with about 5 layers of elliptical to subglobose cells, up to 30μ diameter, with thin dark-brown walls; that flanking the hymenium composed of radiating hyphae terminated by dark-brown pyriform cells, about 12–15 × 6–8μ, passing at the margin into a few rows of hyaline hyphae parallel with the hymenial elements and considerably outtopping the last brown pyriform cells; flesh whitish, of compact thinwalled hyphae 5–6μ wide. Asci cylindric-clavate, about 110 × 9–10μ, 8-spored, the large pore deep blue in Melzer's reagent; ascospores biseriate, cylindrical with rounded ends, often slightly curved, 11–13 × 2μ; paraphyses cylindrical with rounded tips, 2·5μ wide. On decorticated rotting wood.

Tasmania: unlocalised, typus in Herb. Tasmanian Museum. Fig. 31.

There is no subiculum but a few dark-brown anchoring hyphae are present.

Fig. 32. *Mollisia undulata.* Apothecium × 5, section of margin × 660.

Mollisia undulata *Rodway* in Pap. & Proc. Roy. Soc. Tasmania **1920,** 155 (1921).

Apothecia gregarious, superficial; disc flat, up to 8 mm. diameter, cinereous, drying black; receptacle discoid, smooth, black, with slightly

incurved cinereous margin, sessile on a broad base. Excipulum in the basal region very thick, about 150μ, composed of thinwalled subglobose cells 20–40μ diameter, the outer 4–5 layers brown-walled, the remainder hyaline, resting on a pad of hyaline matted hyphae, excipular cells smaller towards the margin where they are cylindric-clavate, 4–5μ wide and hyaline. Flesh thick, white, composed of closely packed hyaline hyphae 4–5μ wide; subhymenium well developed. Asci narrowly cylindric-clavate, about 65 × 4μ, 8-spored, the pore blued by Melzer's reagent; ascospores uniseriate, narrowly elliptic-cylindric, straight, nonseptate, hyaline, 5–9 × 1·5–1·75μ; paraphyses cylindrical, obtuse, 2μ wide. On decorticated rotten wood. Successive apothecia occur superimposed on one another and bound together by the compact basal mat of agglutinated hyphae, which also envelopes neighbouring moss shoots.

Tasmania: Cascades, Hobart, Aug. 1919, typus in Herb. Tasmanian Museum. Fig. 32.

Mollisia carneo-alba *Rodway* in Pap. & Proc. Roy. Soc. Tasmania **1924,** 102 (1925).

This is an operculate fungus, referable to the genus *Octospora* S. F. Gray emend. Korf (=*Humarina* Seaver), of the *Humariaceae*.

Mollisia subglobosa *Rodway* in Pap. & Proc. Roy. Soc. Tasmania **1924,** 102 (1925).

The type material appears to have been mostly destroyed by insects and very few apothecia can be detected on it. The following observations are all I have been able to make:

Apothecia scattered, superficial; disc flat to convex, 0·25–0·5 mm. diameter, pale yellowish when soaked up in ammonia, ('pale then smoky-livid to dull green or dull brown', Rodway), soft; receptacle discoid, thin, smooth, black throughout. Excipulum in the basal part composed of 4–5 layers of subglobose cells, about 10μ diameter, with thin dark purplish-brown walls; subhymenium pale, thin, Asci cylindric-clavate, long stalked, 65–70 × 6μ, 6-8-spored, pore blued by Melzer's reagent; ascospores uniseriate, ovate to pyriform, 6–8 × 3–3·5μ, colourless in ammonia but stained red-brown by Melzer's reagent and then appearing distinctly punctate; paraphyses not clearly seen. On dead bark amongst *Nectria* sp. Fig. 33.

Tasmania: Marriotts Fall, June 1924, typus in Herb. Tasmanian Museum.

No purple stain was observed in ammonia but the structure and ascospore shape are reminiscent of *Catinella olivacea* (Batsch ex Fr.) Boud. The apothecia are much too small to be referred to that species, however, and in view of the scanty material available I prefer not to propose a redisposition of the fungus at present. It certainly is not a member of the Lecanorales.

Sorokina lignicola (*Rodway*) *Dennis*, comb. nov.

Rhizina lignicola Rodway in Pap. & Proc. Roy. Soc. Tasmania **1924,** 117 (1925).

Apothecia solitary or gregarious, superficial; disc convex, then flattened with recurved margin, black, up to 2·5 cm. diameter; receptacle thin,

pruinose, concolorous, sessile. Flesh about 0·5 mm. thick, composed of light brown, loosely woven, hyphae 3–4μ wide; excipulum thin, very dark brown, with thinwalled, subglobose cells, 10–15μ diameter, becoming scurfy; asci cylindric-clavate, 80–90 × 5–6μ, 8-spored, apex not blued by Melzer's reagent; ascospores uniseriate or biseriate above, elliptical, 1-septate, hyaline, then light brown, often appearing faintly longitudinally striate with about 4 striae visible at one time; paraphyses slender, 1μ thick, tips agglutinated by a brown matrix. On rotten wood. Fig. 34.

Tasmania: West coast, December 1923, Typus in Herb. Tasmanian Museum.

This is doubtfully distinct from *S. microspora* (Berk.) Sacc., from Venezuela, which, however, has slightly smaller ascospores, 6–7 × 2·5–3μ with less distinct striae. Any resemblance of either fungus to a *Rhizina* is, of course, purely superficial.

Fig. 33. *Mollisia subglobosa.* Portion of section of centre of apothecium × 660.

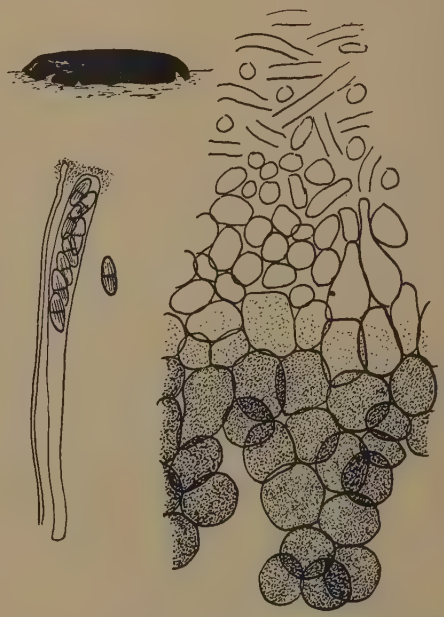

Fig. 34. *Sorokina lignicola.* Apothecium natural size, ascus, paraphysis, spore and section of excipulum × 660.

Hysteropezizella (**Phaeonaevia**) **dianellae** *Dennis*, spec. nov.

Apothecia sparsa, erumpentia, subsuperficialia, patellaria, sessilia, 0·5 mm. diam. atra, humectate plana. Excipulum fuscum, textura globulosa vel breviter prismatica, membranis cellularum atro-brunneis, subopacis. Asci cylindrici vel clavati, apice obtuso-rotundati, octospori, 60–70 × 6–7μ, Iodo non coerulescentes. Ascosporae oblique distichae, hyalinae, continuae, cylindrico-clavatae, 11–14 × 2·5μ. Paraphyses hyalinae, ramosae, filiformes, epithecium formantes, apice paullo incrassatae, atrobrunneae, ad 3μ crassae.

Hab. in foliis emortuis *Dianellae revolutae* (Liliaceae). Fig. 35.

South Australia: Meningie, leg. *L. D. Williams*, January 1956, W.A.R.I. 6668 (Typus); February 1956, W.A.R.I. 6645.

Though the host is neither a grass, sedge nor rush and the apothecia eventually become fully erumpent, this species seems better referred to the subgenus *Phaeonaevia* of *Hysteropezizella* than to *Pyrenopeziza* because of its strongly developed epithecium with swollen brown tips to the paraphyses.

Fig. 35. *Hysteropezizella dianellae*. Section × 660.

Phacidiaceae

Cerion coccineum *Massee & Rodway* in Kew Bull. **1901,** 159 (1901).

Apothecium immersed, approximately circular, polygonal or square, erumpent through bark; disc flat, 1–2 mm. across, waxy, 'Apricot orange' or 'Flame scarlet' (Ridgway), rim erect, black, smooth, clearly divided into 4 or 5 lobes or merely uneven but continuous. Excipulum composed of agglutinated hyphae with short, thick-walled, opaque cells at their tips, forming the black surface layer. Asci 190–200 × 8μ, not capitate, pore not blued by Melzer's reagent, 8-spored; ascospores parallel, cylindrical, straight or slightly curved or undulating towards the upper end, non-septate, hyaline, about 125 × 1μ. Paraphyses simple, cylindric-clavate, 3–4μ thick towards the rounded tip, with reddish oily contents. On dead twigs.

Tasmania: *Rodway* 654 (Typus). Fig. 36.

South Australia: Mt. Lofty, 13.7.1952, leg. *C. G. Hansford*, W.A.R.I. 2110.

According to Massee the ascospores are 'for a long time continuous then multiseptate, finally breaking up at the septa into cells about 8–10μ long.' This was not observed in the South Australian material examined. As the asci are narrowly clavate rather than strictly cylindrical and are not capitate the genus seems to find its place among the Phacidiaceae rather than in Ostropales. In general appearance and colouring it bears a striking resemblance to '*Godronia*' *splendida* Speg., on dead branches in Brasil, but in the

Fig. 36. *Cerion coccineum*. Apothecia on twig natural size, ascus and paraphysis × 660.

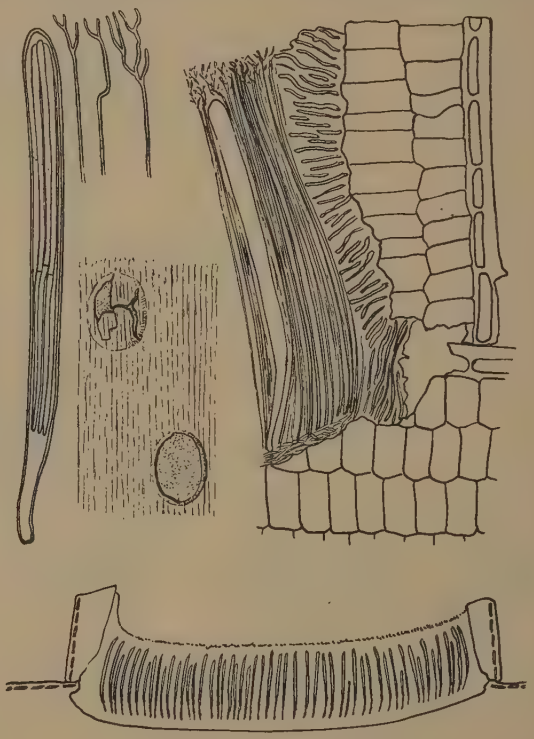

Fig. 37. *Nemacyclus gilvus*. Two apothecia in surface view × 20, diagrammatic section × 150, section of margin × 500, ascus and paraphyses × 660.

latter the apothecia become superficial and the paraphyses have dichotomously branched unswollen tips. The two species are evidently not congeneric. The affinity of *Cerion* seems to be rather with *Colpoma* Wallroth than with *Schizoxylon* Pers., to which Massee compared it. Typical species of *Colpoma*, however, have peculiar whip-like paraphyses, not enlarged at the tip. In its asci, paraphyses, ascospores, excipular structure, iodine reaction and colouring *Cerion* is totally unlike *Stictis*, to which Ainsworth and Bisby unaccountably refer it.

Nemacyclus gilvus *Rodway* in Proc. Roy. Soc. Tasmania **1917,** 107 (1918).

Apothecia scattered, immersed, broadly elliptical, up to 0·5 mm. diameter, exposed by breaking away of the host epidermis in irregular flakes. Disc flat, white, pruinose, margin surrounded by a narrow rim of upturned host

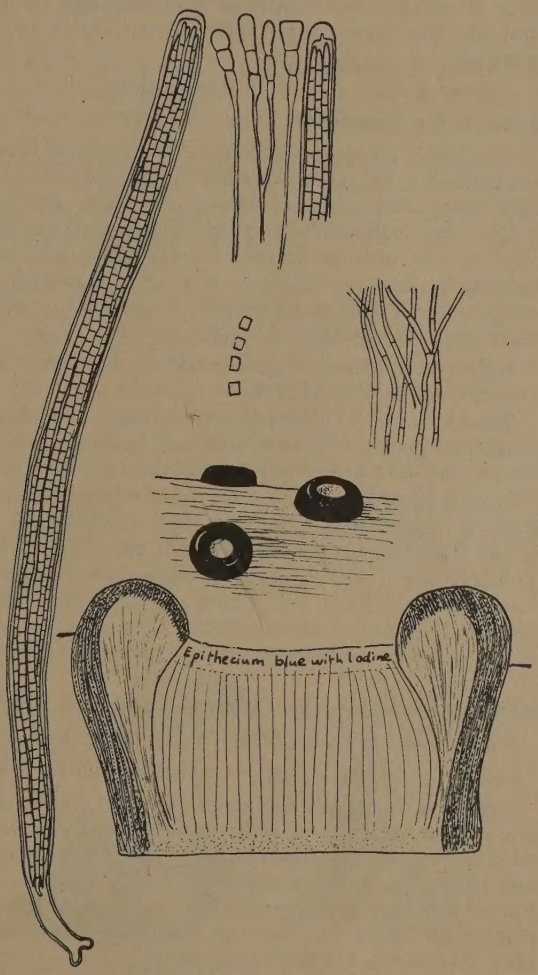

FIG. 38. *Schizoxylon hansfordii.* Three apothecia 5, diagrammatic section × 100, details × 660.

epidermis, coated on the inner side by a thin layer of slender hyphae in a hyaline matrix which, owing to their attachment to the upturned remnant of the lid, have come to lie at right angles to the rest of the hymenium. Hymenium pale buff, asci cylindrical, short-stalked, about 115 × 8μ, 8-spored, wall not thickened at the apex, with no indication of a pore plug in iodine; ascospores parallel, cylindrical, straight or nearly so, hyaline, sparingly septate, 90–100 × 1–1·5μ; paraphyses abundant, thread-like, 1μ

thick, more or less branched at the tips, which protrude above the hymenium to form the pruinose epithecium. Hypothecium very thin, hyaline, of slender woven hyphae. Fig. 37. On dead leaves of *Lepidosperma laterale*, Cape Frederick Henry, Tasmania, Nov. 1907.

Rodway's brief published diagnosis gave no anatomical details or dimensions of microscopic features but indicated that the spores break down at maturity into numerous globose particles. This is not apparent in the Kew material.

Ostropales

Schizoxylon hansfordii *Dennis*, spec. nov.

Gregarium vel sparsum; ascomatibus corticolis, erumpentibus, primitus subhemisphaercis, supra explanato marginatis, centro umbilicatis, margine atro, disco albo, pruinoso, ad 0·5 mm. latis; ascis cylindraceis, capitatis, c. 210 × 9μ, jodo haud tinctis; sporidiis filiformibus, parallelis, pluriseptatis, mox in ipso asco in articulos secedentibus; articulis elongatis vel subcuboidis, utrinque truncatis, 2·5–6 × 1·5–2·5μ; paraphysibus filiformibus, 1μ crassis, versus apicem incrassatis, 3–5μ crassis, epithecium jodo intense coeruleum efformantibus. Fig. 38.

Hab. in caulibus siccis *Lini marginalis*. Meningie, South Australia, Jan. 1957, W.A.R.I. 7719 (Typus).

The excipulum is composed of very slender, branched, septate hyphae in a gelatinous matrix. These hyphae are hyaline in the inner zone, slightly thicker and dark-brown in the outer zone of the excipulum.

Critical revisions of the genera *Stictis* Pers ex Fr. and *Schizoxylon* Pers. ex Chev. are much needed but the above collection seems different from most of the described species in its smooth black rim and white pruinose disc, probably also in the swollen tips of its paraphyses. Among those available for comparison at Kew it most closely resembles *Stictis glaucoma* Berk. & Curt., on twigs in eastern North America. In the latter, however, the blue reaction of the epithecium with iodine has not yet been observed.

Stictis arundinacea *Pers.*, Mycologia Europaea **1,** 336 (1822).

Schmitzomia arundinacea (Pers.) Karst., Mycologia Fennica **1,** 239 (1871).

Cyclostoma arundinacea (Pers.) Crouan, Florule du Finistère 30 (1867).

Apothecia scattered, immersed, about 0·5 mm. across, disc flat, dark gray, margin prominent, white pulverulent. Asci cylindrical, about 200 × 5μ, 8-spored, capitate, not blued by iodine; ascospores fasciculate, undulating, about 1·5μ wide and almost as long as the asci, cells 5–8μ long; paraphyses filiform; hypothecium and marginal hyphae dark gray-brown. Neither the epithecium nor the hymenium shows any blue reaction with Melzer's reagent. On dead grass stems.

South Australia: Meningie, *L. D. Williams* 146, May 1957.

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Le Gal, M. 1953. in Revue de Mycologie N.S. 18, 73–152.
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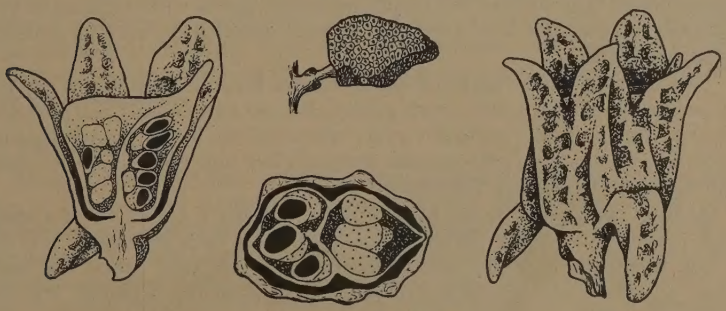
Xylocalyx (Scrophulariaceae) in Somaliland

J. B. GILLETT and S. CARTER

Xylocalyx (Balfour (1888)) has hitherto been thought to be endemic to Socotra, however three specimens have now been found among collections sent to Kew from the mainland of Africa.

E. BRITISH SOMALILAND. Wadamago, 46° 17′ E., 8° 55′ N., 1200 m.; c. 1·2 m. tall, grazed by sheep, but not camels; Somali name LUFF; 4 Aug. 1941, *E. F. Peck* 15. Duruksi, 45° 32′ E., 8° 32′ N., 750 m.; bushy 15–22 cms. tall, grazed by sheep and goats; root used as a probe for cleaning the nostrils of sheep and goats when clogged from catarrh; Somali name SANABANAYE; 13 Sept. 1941, *E. F. Peck* 327. Plains east of Ainabo, 46° 27′ E., 8° 57′ N., 810 m.; with scattered *Acacia spirocarpa, Euphorbia robecchii, Kelleronia*, woody plant, c. 60 cm. tall, flowering profusely, flowers pale pink; 15 Oct. 1957; *Bally* 11886.

Balfour made two gatherings of *Xylocalyx asper*, nos. 697 and 111 of which he designates 697 as the type. He points out that there are several differences between the two, 697 being a virgately-branched form covered with coarse prickles, while 111 is a dwarf form, with shorter pedicels, smaller flowers and fruits, calyces which become delicately skeletonised, and fewer, smaller prickles. He refrains, however, from giving a varietal or other name to his 111. Mr. and Mrs. T. Bent, who visited Socotra in 1897 also obtained both forms of the plant. Vierhapper (1907), repeats Balfour's discussion and identifies his Paulay specimen (5.–13./2. 1899) with *Balfour* 697, but also refrains from describing a variety. All three of the mainland plants mentioned here are closer to *Balfour* 111 than to 697, although they almost entirely lack the minute papillae, or prickles, on the calyces and young inflorescence axes which are seen in *Balfour* 111.



Xylocalyx asper Balf. f.

FIG. 1. Indurated fruiting calyx and bracteoles × 4. FIG. 2. L.S. of fruit and fruiting calyx × 4. FIG. 3. T.S. of the same × 6. FIG. 4. Seed × 15.

The opportunity is taken here to mention the fruit of *Xylocalyx* which in the Somaliland material, and apparently also in *Balfour* 111, is markedly asymmetric, the capsule being produced into a beak on one side. This protrudes between the lobes of the hardened calyx which completely encloses

the capsule. Dehiscence is loculicidal but the seeds appear to remain undispersed for some time. The fruit in *Balfour* 697 is not mature, but it seems as though it may be much less asymmetric.

Should the examination of further material show this suspected difference in the fruit to be real, this together with the indumentum characters already noted may well lead future workers to accept the existence of two varieties or even species but for the present it seems prudent to follow Balfour and Vierhapper in suspending judgement on this point.

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I. B. Balfour (1888). Botany of Socotra (Trans. Roy. Soc. Edin. 31) p. 205 t. 63.

F. Vierhapper (1907). Beitr. zur Kenntniss der Flora Südarabiens und der inseln Sokotra, Semha und Abd el Kuri (Denk. Math. Nat. Wiss. Class. Kais. Ak. Wiss. Wien Bnd. 71) p. 135 (455).

A pocket bird-book for West Africa.*—The visitor to the tropics who is interested in ornithology has always had difficulty in naming the many unfamiliar birds he sees around him. Even if there is a standard reference book and he is able to afford and obtain it, he may find it quite unsuitable to carry around for use in the 'wilds'.

West Africa, thanks to the industry of Dr. D. A. Bannerman, has been well provided with reference books on birds. His standard work 'The Birds of Tropical West Africa', published in eight volumes between 1930 and 1951 is now largely out of print and is difficult and expensive to obtain. His condensed work 'The Birds of West and Equatorial Africa' was published in two volumes in 1952, and went a long way towards meeting the need for a handy reference book.

Now Penguin Books have published 'Larger Birds of West Africa' by the same author. This is in their usual pocket size and sells for only half a crown. It describes in detail practically every species of the larger (non-Passerine) birds known to occur between the Senegal river and the Cameroon highlands, except for migrants from Europe.

At least one representative of most of the families is portrayed in a black and white illustration by Henrick Grönvold. After each description is given a brief habitat note and the known distribution within West Africa. The book also contains a Glossary of technical terms to assist the beginner, but unfortunately lacks an index.

Both the experienced ornithologist and the tyro bird-watcher going to West Africa will find this book essential. It should also have a ready sale among the younger generation of Africans who are beginning to appreciate the wealth of wild life around them.

E. Milne-Redhead.

*'Larger Birds of West Africa' by D. A. Bannerman, pp. 195, 54 illustrations. Penguin Books, West African Series (W.A.10), 1958. 2/6.